MITSUBISHI ELECTRIC

700 series

INVERTER
Plug-in option
FR-A7NCE
INSTRUCTION MANUAL

CC-Link IE Field *Network*
communication function

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Thank you for choosing this Mitsubishi Inverter plug-in option.
This Instruction Manual gives handling information and precautions for use of this equipment. Incorrect handling might cause an unexpected fault. Before using the equipment, please read this manual carefully to use the equipment to its optimum.
Please forward this manual to the end user.

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect this product until you have read through this Instruction Manual and appended documents carefully and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠ WARNING	Incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

The ⚠ CAUTION level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

⚠ WARNING

- While power is ON or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.
- Even if power is OFF, do not remove the front cover except for wiring or periodic inspection. You may accidentally touch the charged inverter circuits and get an electric shock.
- Before wiring or inspection, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring or inspection shall wait for at least 10 minutes after the power supply has been switched OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The plug-in option must be installed before wiring. Otherwise, you may get an electric shock or be injured.
- Do not touch the plug-in option or handle the cables with wet hands. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.

2. Injury Prevention

⚠CAUTION

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter as they will be extremely hot. Doing so can cause burns.

3. Additional Instructions

Also the following points must be noted to prevent an accidental failure, injury, electric shock, etc.

1) Transportation and mounting

⚠CAUTION

- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the product.
- The mounting orientation must be correct.
- Foreign conductive objects must be prevented from entering the inverter. That includes screws and metal fragments or other flammable substances such as oil.

2) Trial run

⚠CAUTION

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

3) Usage

⚠WARNING

- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. Doing so may lead to fault or damage of the inverter.

⚠CAUTION

- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- For prevention of damage due to static electricity, nearby metal must be touched before touching this product to eliminate static electricity from your body.

4) Maintenance, inspection and parts replacement

⚠CAUTION

- Do not test the equipment with a megger (measure insulation resistance).

5) Disposal

⚠CAUTION

- This inverter plug-in option must be treated as industrial waste.

6) General instruction

Many of the diagrams and drawings in this Instruction Manual show the inverter without a cover or partially open for explanation. Never operate the inverter in this manner. The cover must be reinstalled and the instructions in the inverter manual must be followed when operating the inverter.

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MEMO

1 PRE-OPERATION INSTRUCTIONS

1.1 Inverter model

The inverter models 55K and 75K stated in this Instruction Manual differs according to each -NA, -EC, -CHT versions. Refer to the following correspondence table for each inverter model. (Refer to *the instruction manual* of each inverter for the inverter type.)
For example, "for the 75K or higher" indicates "for the FR-A740-01440-NA or higher" in the case of FR-A740 of NA version.

		NA	EC	CHT
A700	FR-A720-55K	FR-A720-02150-NA	—	—
	FR-A720-75K	FR-A720-02880-NA	—	—
	FR-A740-55K	FR-A740-01100-NA	FR-A740-01800-EC	FR-A740-55K-CHT
	FR-A740-75K	FR-A740-01440-NA	FR-A740-02160-EC	FR-A740-75K-CHT

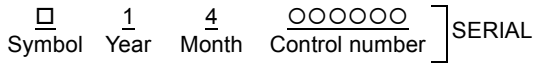
1.2 Unpacking and product confirmation

Take the plug-in option out of the package, check the product name, and confirm that the product is as you ordered and intact.
This product is a plug-in option for the FR-A700 series manufactured in April 2011 or later.

- **SERIAL number check**

  Refer to *the inverter manual* for the location of the rating plate.

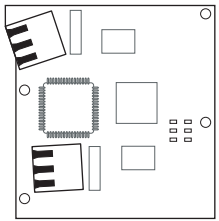
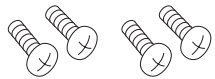
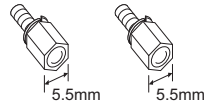
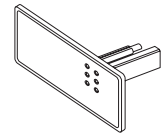
  Rating plate example

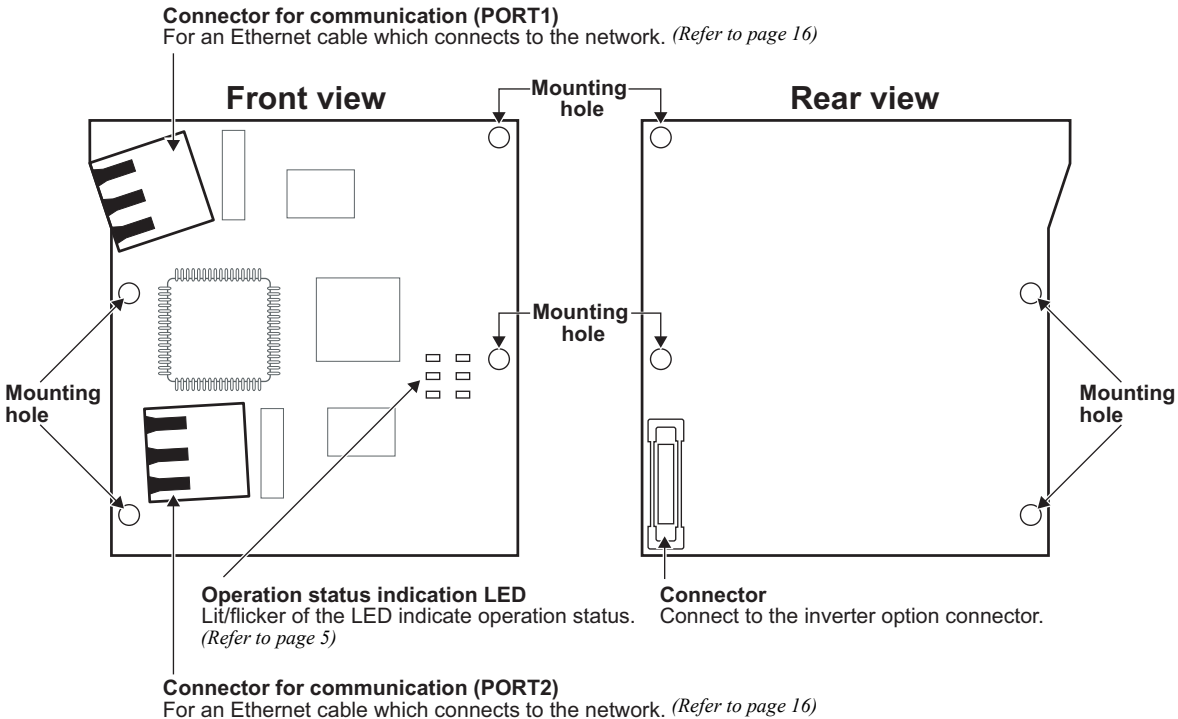
  The SERIAL consists of one symbol, two characters indicating production year and month, and six characters indicating control number.
  The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

1.2.1 Product confirmation

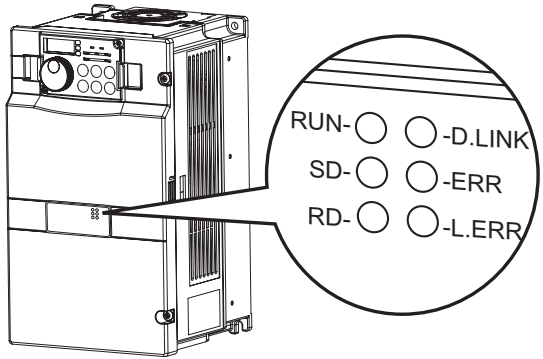
Check the enclosed items.

Plug-in option ..... 1 	Mounting screw (M3 × 6mm) ..... 4 *(Refer to page 9.)* 	Hex-head screw for option mounting (5.5mm)..... 2 *(Refer to page 9.)* 	Communication option LED display cover ..... 1 *(Refer to page 8.)* 

1.3 Parts


Connector for communication (PORT1)
For an Ethernet cable which connects to the network. (Refer to page 16)
Front view
Mounting hole
Rear view
Mounting hole
Mounting hole
Mounting hole
Operation status indication LED
Lit/flicker of the LED indicate operation status. (Refer to page 5)
Connector
Connect to the inverter option connector.
Connector for communication (PORT2)
For an Ethernet cable which connects to the network. (Refer to page 16)

●Operation status LEDs



LED name	Description	ON	OFF
RUN	Operation status	Normal operation (normal 5V internal voltage) *1	Hardware failure
SD	Transmission status	Data transmitting	No data transmitting
RD	Reception status	Data receiving	No data receiving
D.LINK	Cyclic communication status	Cyclic transmitting	No cyclic transmitting or disconnected
ERR	Node failure status *2	Node failure	Normal operation
L.ERR	Link error	Received data error	Received data normal

*1 Also lit in no-communication state.

*2 This LED indicates a communication break between the master station and FR-A7NCE (due to cable disconnection or breakage, power-OFF of the master power supply, or reset, etc.)

1.4 CC-Link IE Field Network communication specifications

Type	Inverter plug-in option type, RJ-45 connector connection method			
Power supply	5VDC supplied from the inverter			
Transmission speed	1Gbps			
Communication method	Token passing			
Number of units connected	120 units at max. (64 units when all stations are inverters handling 128-word transmissions.) Different devices can be connected together.			
Maximum distance between nodes	100m			
Maximum number of branches	No upper limit within the same Ethernet system			
Topology	Line, star, ring, or a combination of line and star			
Connection cable	Ethernet cable (IEEE 802.3 1000BASE-T compliant cable or ANSI/TIA/EIA-568-B (Category 5e) compliant shielded 4-pair branched cable)			
Connector	Shielded RJ-45			
Node type	Intelligent device station	Maximum cyclic size (of one node)	RX	64 bits
			RY	64 bits
			RWr	128 words
			RWw	128 words
		Transient transmission	Not available	

2 INSTALLATION

2.1 Pre-installation instructions

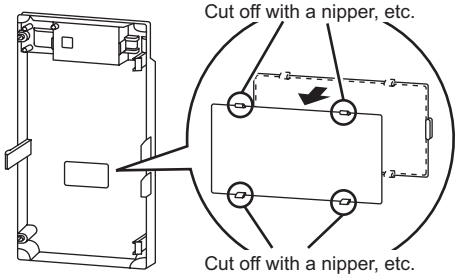
Make sure that the input power of the inverter is OFF.

⚠ CAUTION
⚠ **With input power ON, do not install or remove the plug-in option. Otherwise, the inverter and plug-in option may be damaged.**
⚠ **For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.**

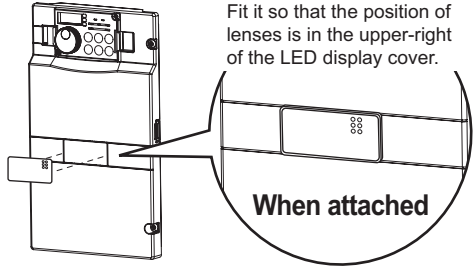
2.2 Installation of the communication option LED display cover

Mount the cover for displaying the operation status indication LED for the communication option on the inverter front cover.

1) Cut off hooks on the rear of the inverter front cover with nipper, etc. and open a window for fitting the LED display cover.



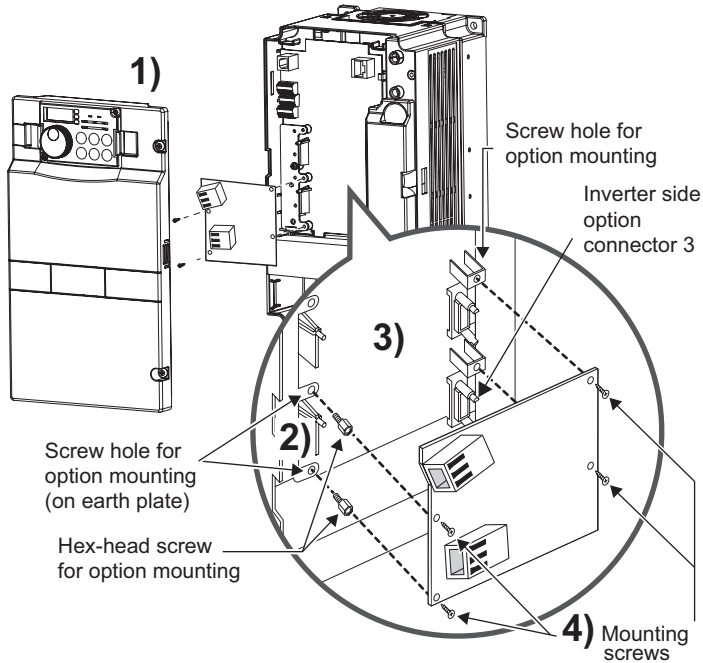
2) Fit the communication option LED display cover to the front of the inverter front cover and push it into until fixed with hooks.



⚠ CAUTION

⚠ Take caution not to hurt your hand and such with portions left by cutting hooks of the rear of the front cover.

2.3 Installation procedure



1) Remove the inverter front cover.

2) Mount the hex-head screw for option mounting into the inverter screw hole (on earth plate) (Size 5.5mm, tightening torque 0.56N·m to 0.75N·m).

3) Securely fit the connector of the plug-in option to the inverter connector along the guides. Occupies space equivalent to two option units.

4) Securely fix four points of the plug-in option to the inverter with the accessory mounting screws. (Tightening torque 0.33N·m to 0.40N·m)
If the screw holes do not line up, the connector may not have been plugged securely. Check for loose plugging.

REMARKS

- Remove a plug-in option after removing four screws on both left and right sides.
(The plug-in option is easily removed if the control circuit terminal block is removed before.)

CAUTION

- **When using this option unit, mount it in the "option connector 3 (lowermost connector)" of the inverter.**

  If it is fitted in option connector 1 or 2, " E. 1 " or " E. 2 " (option fault) is displayed and the inverter will not function. In addition, when the inverter cannot recognize that the option is mounted due to improper installation, etc., " E. 3 " (option fault) is displayed even if the option is fitted in the option connector 3.

Mounting Position	Fault Display
Connector 1	E. 1
Connector 2	E. 2
Connector 3	E. 3

- **This option unit requires space equivalent to two option units. Only one option can be used at a time. For other option units, mount it in the option connector 1. They cannot be connected in the option connector 2.**
- **When mounting/removing an option, hold the sides of the circuit board. Do not press on the parts on the circuit board. Stress applied to the parts by pressing, etc. may cause a failure.**
- **Take care not to drop a hex-head screw for option mounting or mounting screw during mounting and removal.**
- **Pull out the option straight to remove. Pressure applied to the connector and to the circuit board may break the option.**

3.1 System configuration example

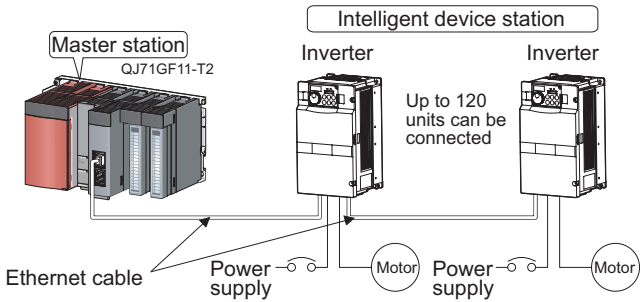
(1) Programmable controller side
Mount the "QJ71GF11-T2" "CC-Link IE Field Network master/local module" on the main or extension base unit having the programmable controller CPU used as the master station.

(2) Inverter side
Mount the option (FR-A7NCE) on the inverter.

(3) Connect the CC-Link IE Field Network programmable controller (master station) to FR-A7NCE with an Ethernet cable. Connect an Ethernet cable, then remove the front cover.

Instruction manual regarding the CC-Link IE Field Network master station

· QJ71GF11-T2 type
MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual
··· SH-080917ENG



3.2 Network configuration

(1) Network topology

The network can be wired into star topology, line topology, and ring topology.

A network can consist of a combination of star and line topologies, but the ring topology cannot be combined with star or line topology.

Item	Description
Star topology	The network is configured into a star using a switching hub and Ethernet cables. Slave stations can be easily added to the network using this topology. (Add/remove slave stations one by one. If multiple slave stations are added/removed at a time, all stations on the network will be reconnected, and an error may momentarily occur in all the stations.)
Line topology	The network is configured into a line by connecting the modules with Ethernet cables, but without a switching hub.
Ring topology	The network is configured into a ring using Ethernet cables, but without a switching hub. Data link continues with the stations that are operating normally.

(2) Station number and connection position

Modules can be connected in any order regardless of the station number.

(3) Cascade connection

Up to 20-layer connection is available for the cascade connection.

(4) Replacing CC-Link IE Field Network devices

For star topology, slave stations can be replaced without powering off the whole system.

REMARKS

- Refer to *the MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual* for the detailed network configurations.

3.3 Network components

This section describes components comprising the CC-Link IE Field Network.

3.3.1 Connection cable

For wiring, use the 1000BASE-T compliant Ethernet cables.

Ethernet cable	Connector	Type
Category 5e or higher (Double shielded/STP) Straight cable	RJ-45 connector	The following conditioning cables: · IEEE802.3 (1000BASE-T) · ANSI/TIA/EIA-568-B (Category 5e)

CAUTION

· For CC-Link IE Field Network wiring, use the recommended wiring components by CC-Link Partner Association.
· Cables for CC-Link IE Controller Network cannot be used for CC-Link IE Field Network.

3.3.2 Hubs

Use hubs that meet the conditions listed below:

- Compliance with the IEEE802.3 (1000BASE-T)
- Support of the auto MDI/MDI-X function
- Support of the auto-negotiation function
- Switching hub (layer 2 switch) *

Operation is not guaranteed if the hubs do not meet these conditions.

* A repeater hub is not available.

Industrial switching hub

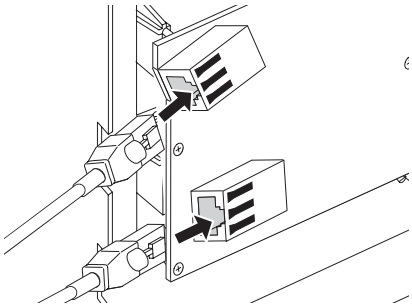
Type	Manufacturer
NZ2EHG-T8	Mitsubishi Electric Corporation

3.4 Wiring

This section describes the cable wiring and precautions. For network configuration, cables, and hubs used for the wiring, *refer to page 12 and subsequent pages*.

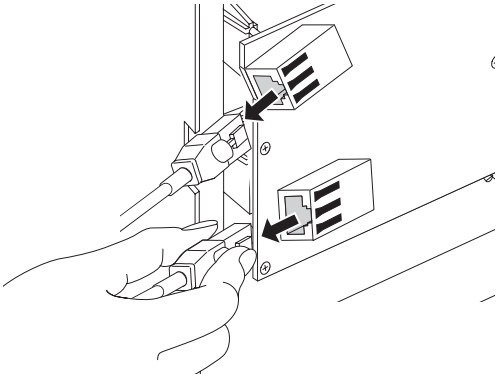
3.4.1 Ethernet cable connection

(1) Connecting the cable



1. Turn OFF the inverter power supply.
2. Remove the front cover.
3. Check the direction of the Ethernet cable connector.
   Insert the connector to the communication connector of FR-A7NCE until it clicks.

(2) Disconnecting the cable

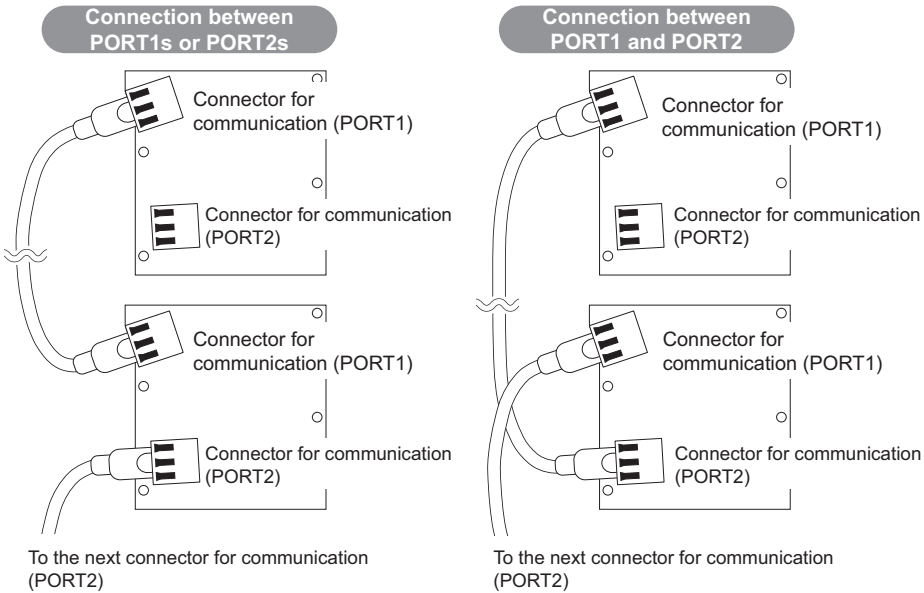


1. Turn OFF the inverter power supply.
2. Remove the front cover.
3. Hold down the latch on the Ethernet cable connector, and pull out the cable while holding the latch.

REMARKS

PORT1 and PORT2 do not need to be distinguished.

- When only one connector is used in star topology, either PORT1 or PORT2 is applicable.
- When using two connectors for line topology and ring topology, an Ethernet cable can be connected to the connectors in any combination. For example, the cable can be connected between PORT1s or between PORT1 and PORT2.


Connection between PORT1s or PORT2s
Connector for communication (PORT1)
Connector for communication (PORT2)
Connector for communication (PORT1)
Connector for communication (PORT2)
To the next connector for communication (PORT2)
Connection between PORT1 and PORT2
Connector for communication (PORT1)
Connector for communication (PORT2)
Connector for communication (PORT1)
Connector for communication (PORT2)
To the next connector for communication (PORT2)

3.4.2 Precautions

This section describes wiring precautions.

(1) Handling of the Ethernet cable
- Do not touch the core of the cable-side or module-side connector, and protect it from dirt or dust. If oil from your hand, dirt or dust is attached to the core, it can increase transmission loss, arising a problem in data link.
- Check the following:
  - Is any Ethernet cable disconnected?
  - Is any of the Ethernet cables shorted?
  - Are the connectors securely connected?

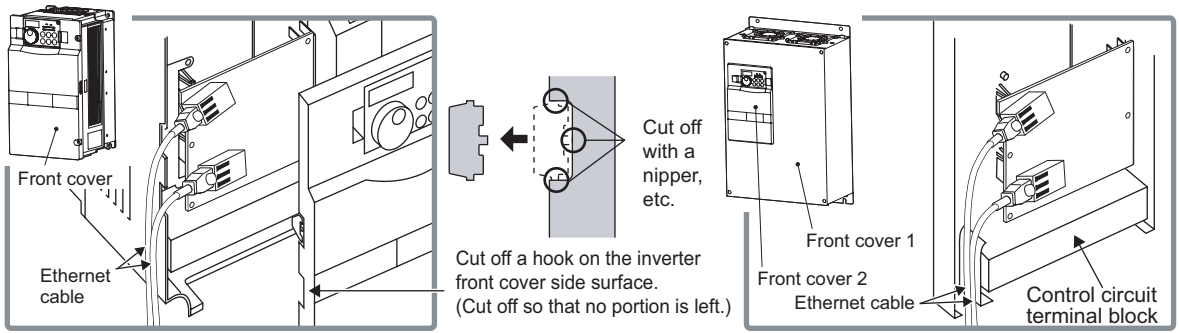
(2) Broken cable latch
Do not use Ethernet cables with broken latches. Doing so may cause the cable to unplug or malfunction.

(3) Connecting and disconnecting the Ethernet cable
Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling a cable connected to the module may damage the module or cable, or result in malfunction due to poor contact.

(4) Maximum station-to-station distance (maximum cable length)
The maximum station-to-station distance is 100m. However, the distance may be shorter depending on the operating environment of the cable. For details, contact your cable manufacturer.

(5) Network configuration
Check the instructions on *page 12* before wiring, and perform correct wiring.

(6) For wiring of the inverter which has one front cover, remove a hook of the front cover, and use the space that becomes available.
For wiring of the inverter which has front cover 1 and 2, use the space on the left side of the control circuit terminal block.


Front cover
Ethernet cable
Cut off with a nipper, etc.
Cut off a hook on the inverter front cover side surface.
(Cut off so that no portion is left.)
Front cover 1
Front cover 2
Ethernet cable
Control circuit terminal block

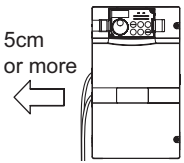
Inverter which has one front cover **Inverter which has front cover 1 and 2**

REMARKS

- When the hook of the inverter front cover is cut off for wiring, the protective structure (JEM1030) changes to open type (IP00).
- When using an option other than FR-A7NCE, connect the other option's cable to the option connector 1, then connect FR-A7NCE.

⚠ CAUTION

⚠ **When installing 3.7K or lower inverter, keep 5cm or more clearance between the inverter left and the other equipment or enclosure surface. This clearance is necessary to wire the Ethernet cable. (Refer to** *the inverter manual* **for more installation conditions.)**



⚠ **When performing wiring using the space between the inverter front cover and control circuit terminal block, take caution not to subject the cable to stress.**

⚠ **After wiring, wire offcuts must not be left in the inverter. They may cause an error, failure or malfunction.**

4.1 Parameter list

The following parameters are used for the plug-in option (FR-A7NCE).
Set the values according to need.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value	Refer to Page
79	Operation mode selection	0 to 4, 6, 7	1	0	*23*
313 *1	DO0 output selection	0 to 8, 10 to 20, 25 to 28, 30 to 36, 39, 41 to 47, 64, 70 to 78, 84 to 99, 100 to 108, 110 to 116, 120, 125 to 128, 130 to 136, 139, 141 to 147, 164, 170, 184 to 199, 9999	1	9999	*49*
314 *1	DO1 output selection				
315 *1	DO2 output selection				
338	Communication operation command source	0, 1	1	0	*3
339	Communication speed command source	0, 1, 2	1	0	*3
340	Communication startup mode selection	0, 1, 2, 10, 12	1	0	*23*
342	Communication EEPROM write selection	0, 1	1	0	*3
349 *1	Communication reset selection	0, 1	1	0	*32*
434*1, *2	Network number (CC-Link IE)	0 to 255	1	0	*33*
435*1, *2	Station number (CC-Link IE)	0 to 255	1	0	*33*
500 *1	Communication error execution waiting time	0 to 999.8s	0.1s	0	*26*
501 *1	Communication error occurrence count display	0	1	0	*27*
502 *1	Stop mode selection at communication error	0 to 3	1	0	*28*
541 *1	Frequency command sign selection (CC-Link)	0, 1	1	0	*34*
550 *2	NET mode operation command source selection	0, 1, 9999	1	9999	*3
804	Torque command source selection	0 to 6	1	0	*64*

*1 Parameters which can be displayed when the plug-in option (FR-A7NCE) is mounted.
*2 The setting is reflected after inverter reset or at the next power-ON.
*3 Refer to *Chapter 4 of the inverter manual* for the parameter details.

4.2 Operation mode setting

4.2.1 Operation mode switching and communication startup mode (Pr. 79, Pr. 340)

(1) Operation mode switching conditions

Before switching the operation mode, check that:
1) The inverter is at a stop;
2) Both the STF and STR signals are OFF; and
3) The *Pr. 79 Operation mode selection* setting is correct.
(Set with the operation panel of the inverter.)
Refer to *the Inverter Manual* for details of *Pr. 79*.

(2) Operation mode selection at power ON and at restoration from instantaneous power failure

The operation mode at power ON and at restoration from instantaneous power failure can be selected.
Set a value other than "0" in *Pr. 340* to select the Network operation mode.
After started in Network operation mode, parameter write from the network is enabled. (Refer to *page 75* for a program example for parameter write.)

REMARKS

- Change of the *Pr. 340* setting is valid when powering ON or resetting the inverter.
- *Pr. 340* can be changed with the operation panel in any operation mode.

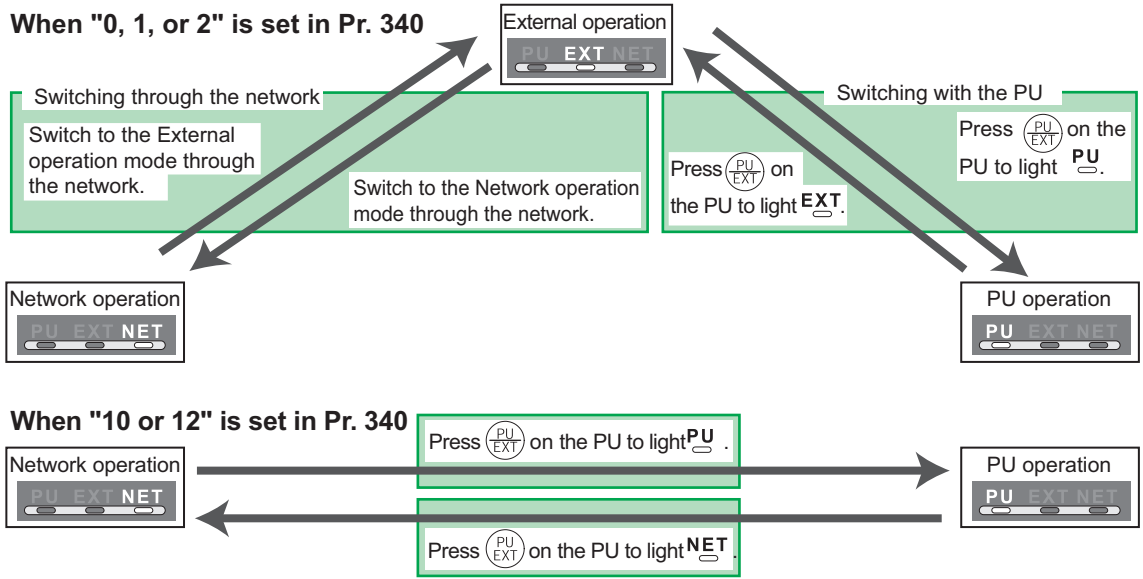
Pr. 340 Setting	*Pr. 79* Setting	Operation Mode at Power ON or Power Restoration	Operation Mode Switchover
0 (initial value)	0 (initial value)	External operation mode	Switching among the External, PU, and NET operation mode is enabled *1
	1	PU operation mode	PU operation mode fixed
	2	External operation mode	Switching between the External and NET operation mode is enabled Switching to the PU operation mode is disallowed
	3, 4	External/PU combined operation mode	Operation mode switching is disallowed
	6	External operation mode	Switching among the External, PU, and NET operation mode is enabled while running.
	7	X12 (MRS) signal ON ..... External operation mode	Switching among the External, PU, and NET operation mode is enabled *1
		X12 (MRS) signal OFF ... External operation mode	External operation mode fixed (Forcibly switched to External operation mode.)
1, 2 *2	0	NET operation mode	Same as when *Pr. 340* = "0"
	1	PU operation mode	
	2	NET operation mode	
	3, 4	External/PU combined operation mode	
	6	NET operation mode	
	7	X12 (MRS) signal ON .... NET operation mode	
		X12 (MRS) signal OFF ... External operation mode	
10, 12 *2	0	NET operation mode	Switching between the PU and NET operation mode is enabled *3
	1	PU operation mode	Same as when *Pr. 340* = "0"
	2	NET operation mode	NET operation mode fixed
	3, 4	External/PU combined operation mode	Same as when *Pr. 340* = "0"
	6	NET operation mode	Switching between the PU and NET operation mode is enabled while running *3
	7	External operation mode	Same as when *Pr. 340* = "0"

*1 Operation mode cannot be directly changed between the PU operation mode and Network operation mode.

*2 The *Pr. 340* settings "2, 12" are mainly used for communication operation using the inverter RS-485 terminal.
Even if an instantaneous power failure occurs while *Pr.57 Restart coasting time* ≠ "9999", the inverter continues running at the condition before the instantaneous failure.
When *Pr.340* = "1, 10", a start command turns off if power failure has occurred and then restored during a start command is on.

*3 Operation mode can be changed between the PU operation mode and Network operation mode with PU/EXT on the operation panel (FR-DU07) and X65 signal.

(3) Operation mode switching method


When "0, 1, or 2" is set in Pr. 340
External operation
PU EXT NET
Switching through the network
Switch to the External operation mode through the network.
Switch to the Network operation mode through the network.
Switching with the PU
Press PU/EXT on the PU to light PU.
Press PU/EXT on the PU to light EXT.
Network operation
PU EXT NET
PU operation
PU EXT NET
When "10 or 12" is set in Pr. 340
Network operation
PU EXT NET
Press PU/EXT on the PU to light PU.
Press PU/EXT on the PU to light NET.
PU operation
PU EXT NET

For the switching method with the external terminal, refer to *the Inverter Manual*.
Refer to *page 57* for a switching method through the network.

CAUTION

- When starting the inverter in the Network operation mode at power ON or an inverter reset, set a value other than 0 in *Pr. 340*. *(Refer to page 23)*
- When setting a value other than 0 in *Pr. 340*, make sure that the initial settings of the inverter are correct.

4.3 Operation at communication error occurrence

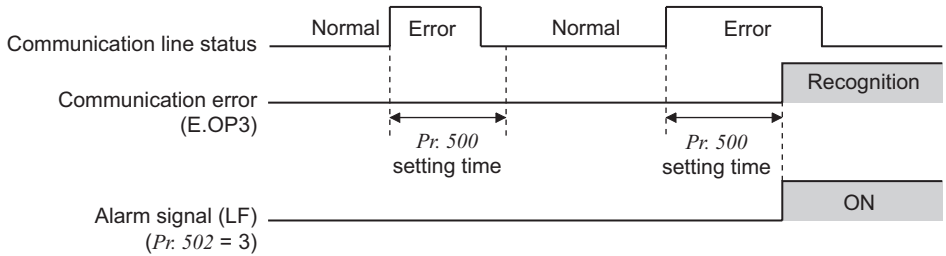
4.3.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

You can select operations at communication error occurrences by setting *Pr. 500* to *Pr. 502* under Network operation.

(1) Waiting time for the communication line error output after a communication error

Waiting time for the communication error output after a communication line error occurrence can be set.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
500	Communication error execution waiting time	0 to 999.8s	0.1s	0



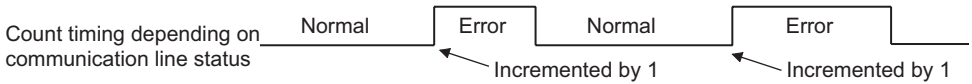
When a communication line error occurs and lasts longer than the time set in *Pr. 500*, it is recognized as a communication error.

If the communication returns to normal within the time, it is not recognized as a communication error, and the operation continues.

(2) Displaying and clearing the communication error count

The cumulative count of communication error occurrences can be displayed.
Write "0" to clear this cumulative count.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
501	Communication error occurrence count display	0	1	0



At the point of communication line error occurrence, *Pr. 501 Communication error occurrence count display* is incremented by 1.

CAUTION

· **Communication error count is temporarily stored in the RAM memory. The error count is stored in EEPROM only once per hour. If power reset or converter reset is performed, *Pr. 501* setting will be the one that is last stored to EEPROM depending on the reset timing.**

(3) Inverter operation at a communication error occurrence

How the inverter operates at a communication line error or an option unit fault can be set.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
502	Stop mode selection at communication error	0, 1, 2, 3	1	0

About setting

●Operation at an error occurrence

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Continued *	Normal indication *	Not provided *
	1			
	2			
	3			
Communication option itself	0, 3	Coast to stop	E. 3 lit	Provided
	1, 2	Decelerated to stop	E. 3 lit after stop	Provided after stop

* When the communication returns to normal within the time period set in *Pr. 500*, the communication option error (E.OP3) does not occur.

●Operation at error detection after elapse of *Pr. 500* time

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Coast to stop	E.OP3 lit	Provided
	1	Decelerated to stop	E.OP3 lit after stop	Provided after stop
	2			Not provided
	3	Continued	Normal indication	
Communication option itself	0, 3	Coast to stop	E.3 lit	Provided
	1, 2	Decelerated to stop	E.3 lit after stop	Provided after stop

●**Operation at error removal**

Error Definition	*Pr. 502* Setting	Operation	Indication	Fault Output
Communication line	0	Kept stopped	E.OP3 kept lit	Kept provided
	1			
	2	Restart	Normal indication	Not provided
	3	Continued		
Communication option itself	0, 3	Kept stopped	E.3 kept lit	Kept provided
	1, 2			

CAUTION

- Communication line error [E.OP3 (fault data: HA3)] is an error that occurs on the communication line. Communication option error [E. 3 (fault data: HF3)] is an error that occurs in the communication circuit inside the option.
- Fault output indicates the fault output signal (terminal ABC1) and fault bit output.
- When the fault output setting is active, fault records are stored in the faults history.
- When the fault output setting is not active, fault record is overwritten to the faults history temporarily but not stored. After the error is removed, the fault indication is reset, changing the display back to normal, and the last fault is displayed in the faults history.
- When the *Pr. 502* setting is "1" or "2", the deceleration time is the ordinary deceleration time setting (e.g. *Pr. 8, Pr. 44, Pr. 45*).
- The acceleration time at a restart is the ordinary acceleration time setting (e.g. *Pr. 7, Pr. 44*).
- When the *Pr. 502* setting is "2", the operation/speed command at a restart is the one given before the error occurrence.
- When a communication line error occurs at the *Pr. 502* setting of "2", removing the error during deceleration causes acceleration to restart at that point. (Acceleration is not restarted if the error is that of the option unit itself.)

4.3.2 Fault and measures

(1) The inverter operates as follows at fault occurrences.

Fault Location	Status		Operation Mode		
			Network Operation	External Operation	PU Operation
Inverter	Inverter operation		**Inverter trip**	Inverter trip	Inverter trip
	Data communication		**Continued**	Continued	Continued
Communication line	Inverter operation		**Inverter trip***	Continued	Continued
	Data communication		**Stop**	Stop	Stop
Communication option	Communication option connection error	Inverter operation	**Inverter trip***	Inverter trip*	Inverter trip*
		Data communication	**Continued**	Continued	Continued
	Error of communication option itself	Inverter operation	**Inverter trip***	Continued	Continued
		Data communication	**Stop**	Stop	Stop

* Depends on the *Pr.502* setting.

(2) Measures at error occurrences

Fault Indication	Error Definition	Measures
E.OP3	Communication line error	Check the LED status of the option unit and remove the cause of the alarm. (Refer to *page 5* for LED indication status) Inspect the master.
E.1, E.2, E.3	Option fault	Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error. Fit the communication option in the option connector 3.

* When faults other than the above are displayed, refer to *the inverter manual* and remove the cause of the error.

4.4 Inverter reset

(Refer to *page 79* for an inverter reset programming example.)

(1) Operation conditions of inverter reset

Which resetting method is allowed or not allowed in each operation mode is described below.

Resetting Method			Operation Mode		
			Network Operation	External Operation	PU Operation
Reset from the network	Inverter reset *(Refer to page 60)* *1		Allowed	Disallowed	Disallowed
	Error reset (RY3A) at inverter fault *(Refer to page 46)* *2	*Pr.349* = 0	Allowed	Allowed	Allowed
		Pr.349 = 1		Disallowed	Disallowed
Turn ON the inverter RES signal (terminal RES)			Allowed	Allowed	Allowed
Switch OFF inverter power			Allowed	Allowed	Allowed
Reset from the PU/DU	Inverter reset		Allowed	Allowed	Allowed
	Reset at inverter fault		Allowed	Allowed	Allowed

*1 Inverter reset can be made any time.
*2 Reset can be made only when the protective function of the inverter is activated.

CAUTION

- When a communication line error has occurred, reset cannot be made from the network.
- The inverter is set to the External operation mode if it has been reset in Network operation mode in the initial status. To resume the network operation, the inverter must be switched to the Network operation mode again. Set a value other than "0" in *Pr. 340* to start in the Network operation mode. *(Refer to page 23.)*
- Communication continues during inverter reset. (The inverter cannot be controlled for about 1s after release of a reset command .)

(2) Error reset operation selection at inverter fault

When an inverter is used with a communication option, an error reset command* from network can be set invalid in the External operation mode or PU operation mode.

Parameter Number	Name	Initial Value	Setting Range	Function
349	Communication reset selection	0	0	Error reset* is enabled independently of operation mode
			1	Error reset* is enabled only in the network operation mode

* RY3A *(Refer to page 46)*

4.5 CC-Link IE Field Network function setting

4.5.1 Network number setting (Pr.434)

Set the inverter network number in *Pr.434*.

Parameter Number	Name	Initial Value	Setting Range
434	Network number (CC-Link IE)	0	0 to 255*

* The setting range of *Pr.434* is "0 to 255", but its active range is "1 to 239". The values out of the active range are invalid because such values cannot be transmitted to the master station.

4.5.2 Station number setting (Pr. 435)

Use *Pr. 435* to set station number of the inverter.

Parameter Number	Name	Initial Value	Setting Range
435	Station number (CC-Link IE)	0	0 to 255*

* The setting range of *Pr.435* is "0 to 255", but its active range is "1 to 120". The values out of the active range are invalid because such values cannot be transmitted to the master station.

CAUTION

· **Use different station numbers for different devices. (If different devices have the same station number, the communication cannot be performed properly.)**

REMARKS

· Station numbers do not have to be consecutive numbers.
· The setting is applied after an inverter reset or power-ON.

4.5.3 Frequency command with sign (Pr.541)

By frequency command with sign, start command (forward rotation/reverse rotation) can be inversed to operate. Make selection of sign for the frequency command from RWw0.

Parameter Numbers	Name	Initial Value	Setting Range
541	Frequency command sign selection (CC-Link)	0	0, 1

Speed Setting Using *Pr.37* and *Pr.144*	*Pr.541* Setting	Sign	Setting Range	Actual Frequency Command
Not used	0	Not used	0 to 40000	0 to 400.00Hz
	1	With	-32768 to 32767 (two's complement)	-327.68 to 327.67Hz
With	0	Not used	0 to 65535	It depends on *Pr.37, Pr.144, Pr.811*. (in 1 or 0.1 increments)
	1	With	-32768 to 32767 (two's complement)	

Relationship between the start command and sign (*Pr.541* = "1")

Start command	Sign of the Frequency Command	Actual Run Command
Forward rotation	+	Forward rotation
	-	Reverse rotation
Reverse rotation	+	Reverse rotation
	-	Forward rotation

REMARKS

- When *Pr.541* = 1 (with sign)
  - When EEPROM write is specified with the RY22, write mode error (error code H01) will occur.
  - When both RY21 and RY22 are turned ON, RY21 has precedence.
  - When power is turned ON (inverter reset), the initial setting status of the sign bit is "positive" and the set frequency is "0Hz". (EEPROM value is not reflected.)
    Note that if the operation mode when power is turned ON (inverter reset) is PU or External/PU combined operation mode 1 (*Pr.79* = 1, 3), the set frequency is EEPROM value.
  - When set frequency is written with the instruction code of HED and HEE, the sign of the frequency command is not changed.
- Setting "1 or 11" in *Pr.811 Set resolution switchover* changes the increments from 1r/min to 0.1r/min.

5 FUNCTION OVERVIEW

5.1 Output from the inverter through the network

Main items which can be output from the inverter to the master and their descriptions are explained below.

Item	Description	Refer to Page
Inverter status monitor	The output terminal status of the inverter can be monitored.	*47*
Output frequency monitor	The output frequency can be monitored.	*56, 57*
Output current monitor	The output current can be monitored.	*57*
Output voltage monitor	The output voltage can be monitored.	*57*
Special monitor	The monitor data selected can be checked.	*57*
Faults history	Fault records can be checked.	*55, 58*
Data at alarm occurrence	The inverter status at alarm occurrence can be checked.	*55*
Operation Mode	The current operation mode can be checked.	*57*
Parameter read	Parameter settings can be read.	*59*
Read of set frequency (torque command)	The current set frequency (torque command) can be read.	*58*

REMARKS

· Refer to *the inverter manual* for functions controllable through the network in each operation mode.

5.2 Input to the inverter through the network

Main commands which can be input from the master to the inverter and their descriptions are explained below.

Item	Description	Refer to Page
Forward rotation command	Give the forward rotation command.	*45*
Reverse rotation command	Give the reverse rotation command.	*45*
Input terminal function command	Execute functions assigned to the inverter input terminals.	*45*
Inverter output stop command	Stop the inverter output.	*45*
Error reset	Reset the inverter only when an inverter alarm occurs.	*46*
Frequency setting (torque command)	Set the frequency (torque command).	*51, 58*
Monitor command	Specify the description monitored.	*53, 57*
Operation mode specification	Set the operation mode.	*57*
Faults history clear	Erase past eight fault records.	*59*
All parameter clear	Return the parameter descriptions to the initial value.	*59*
Inverter reset	Reset the inverter.	*60*
Parameter write	Write parameter settings.	*59*
PID control	PID set point, PID measured value and PID deviation can be input from the network.	*52*

REMARKS

· Refer to *the inverter manual* for functions controllable through the network in each operation mode.

5.3 Cyclic transmission

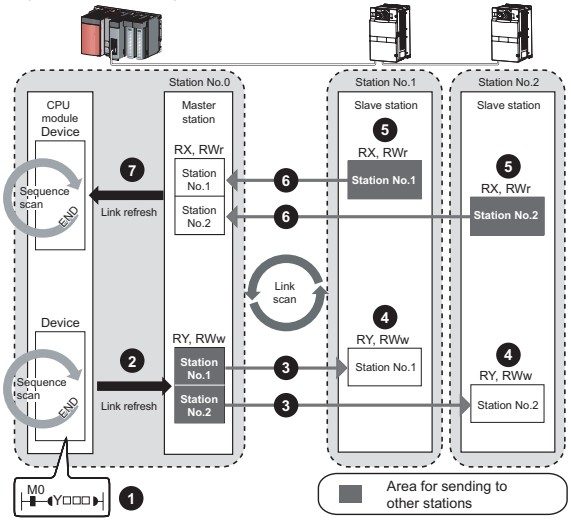
Data communication is available periodically among stations on the same network. Link devices (RX, RY, RWr, and RWw) are used.

5.3.1 Data flow and link device assignment

●Master and slave stations (except for local stations)

One-to-one communication is possible between the master and slave stations.

The status information of the link devices (RY and RWw) of the master station is output to the external device of the slave station, and the input status information from the external device of the slave station is stored in the link devices (RX and RWr) of the master station.



· Output from the master station

1. The device of the CPU module turns ON.
2. The device status data of the CPU module are stored in the link devices (RY and RWw) of the master station by link refresh.
3. The status data of the link devices (RY and RWw) of the master station are stored in the link devices (RY and RWw) of each slave station by link scan.
4. The inverter starts according to the link device (RY and RWw) conditions (input signals such as STF and STR) of the slave station.

· Input from the slave station

5. Inverter conditions (output signals such as RUN and SU, monitoring) are stored in the link devices (RX and RWr) of the slave station.
6. The status data of the link devices (RX and RWr) of the slave station are stored in the link devices (RX and RWr) of the master station by link scan.
7. The status data of the link devices (RX and RWr) of the master station are stored in the devices of the CPU module by link refresh.

REMARKS

· Refer to *the MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual* for the detailed assignment methods for the link devices and link refresh.

6 I/O SIGNAL LIST

6.1 Remote I/O (64 points fixed)

Device No.	Signal	Refer to Page
RYn0	Forward rotation command	45
RYn1	Reverse rotation command	45
RYn2	High-speed operation command (terminal RH function) *1	45
RYn3	Middle-speed operation command (terminal RM function) *1	45
RYn4	Low-speed operation command (terminal RL function) *1	45
RYn5	Jog operation command (terminal Jog function) *1	45
RYn6	Second function selection (terminal RT function) *1	45
RYn7	Current input selection (terminal AU function) *1	45
RYn8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1	45
RYn9	Output stop (terminal MRS function) *1	45
RYnA	Start self-holding selection (terminal STOP function) *1	45
RYnB	Reset (terminal RES function) *1	45
RYnC to RYnF	Reserved	—
RY(n+1)0 to RY(n+1)2		

Device No.	Signal	Refer to Page
RXn0	Forward running	47
RXn1	Reverse running	47
RXn2	Running (terminal RUN function) *2	47
RXn3	Up to frequency (terminal SU function) *2	47
RXn4	Overload alarm (terminal OL function) *2	47
RXn5	Instantaneous power failure (terminal IPF function) *2	47
RXn6	Frequency detection (terminal FU function) *2	47
RXn7	Error (terminal ABC1 function) *2	47
RXn8	— (terminal ABC2 function) *2	47
RXn9 to RXnF	Reserved	—
RX(n+1)0	*Pr. 313* assignment function (DO0) *3	47
RX(n+1)1	*Pr. 314* assignment function (DO1) *3	47
RX(n+1)2	*Pr. 315* assignment function (DO2) *3	47

Device No.	Signal	Refer to Page
RY(n+1)3 to RY(n+1)F	Reserved	—
RY(n+2)0	Monitor command	*46*
RY(n+2)1	Frequency setting command (RAM)	*46*
RY(n+2)2	Frequency setting command (RAM, EEPROM)	*46*
RY(n+2)3	Torque command (RAM)	*46*
RY(n+2)4	Torque command (RAM, EEPROM)	*46*
RY(n+2)5	Instruction code execution request	*46*
RY(n+2)6 to RY(n+3)9	Reserved	—
RY(n+3)A	Error reset request flag	*46*
RY(n+3)B to RY(n+3)F	Reserved	—

Device No.	Signal	Refer to Page
RX(n+1)3 to RX(n+1)F	Reserved	—
RX(n+2)0	Monitoring	*47*
RX(n+2)1	Frequency setting completion (RAM)	*48*
RX(n+2)2	Frequency setting completion (RAM, EEPROM)	*48*
RX(n+2)3	Torque command setting completed (RAM)	*48*
RX(n+2)4	Torque command setting completed (RAM, EEPROM)	*48*
RX(n+2)5	Instruction code execution completion	*48*
RX(n+2)6 to RX(n+3)9	Reserved	—
RX(n+3)A	Error status flag	*48*
RX(n+3)B	Remote station ready	*48*
RX(n+3)C to RX(n+3)F	Reserved	—

("n" indicates a value determined according to the station number setting.)

*1 These signals are set in the initial status. Using *Pr. 180* to *Pr .189*, you can change input signal functions. Signals of the RYn0 and RYn1 cannot be changed. Even when changed using *Pr. 178* and *Pr. 179,* the settings are invalid.
Refer to *the inverter manual* for details of *Pr. 178* to *Pr. 189*.

*2 These signals are set in the initial status. Using *Pr. 190* to *Pr .196*, you can change output signal functions.
Refer to *page 49* for signals which can be assigned.

*3 Output signal can be assigned using *Pr. 313 to Pr. 315*.
Refer to *page 49* for signals which can be assigned.

6.2 Remote register (128 words fixed)

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn	Set frequency (0.01Hz increments)		*51*
RWwn+1	Reserved		—
RWwn+2	Torque command		*51*
RWwn+3	Reserved		—
RWwn+4	PID set point (0.01% increments)*1		*52*
RWwn+5	PID measured value (0.01% increments)*1		*52*
RWwn+6	PID deviation (0.01% increments)*1		*52*
RWwn+7 to RWwn+F	Reserved		—
RWwn+10	Link parameter extended setting	Instruction code*2	*52*
RWwn+11	Write data		*52*
RWwn+12	Link parameter extended setting	Instruction code*2	*52*
RWwn+13	Write data		*52*
RWwn+14	Link parameter extended setting	Instruction code*2	*52*
RWwn+15	Write data		*52*
RWwn+16	Link parameter extended setting	Instruction code*2	*52*
RWwn+17	Write data		*52*
RWwn+18	Link parameter extended setting	Instruction code*2	*52*
RWwn+19	Write data		*52*

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn	Reply code		*54*
RWrn+1	Reserved		—
RWrn+2	Reply code		*54*
RWrn+3	Reserved		—
RWrn+4	Reply code		*54*
RWrn+5	Reply code		*54*
RWrn+6	Reply code		*54*
RWrn+7 to RWrn+F	Reserved		—
RWrn+10	Reply code		*55*
RWrn+11	Read data*2		*55*
RWrn+12	Reply code		*55*
RWrn+13	Read data*2		*55*
RWrn+14	Reply code		*55*
RWrn+15	Read data*2		*55*
RWrn+16	Reply code		*55*
RWrn+17	Read data*2		*55*
RWrn+18	Reply code		*55*
RWrn+19	Read data*2		*55*

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn+1A	Link parameter extended setting	Instruction code*2	52
RWwn+1B	Write data		52
RWwn+1C to RWwn+1F	Reserved		—
RWwn+20	Reserved		—
RWwn+21	Faults history No.		53
RWwn+22 to RWwn+25	Reserved		—
RWwn+26	Monitor code 1		53
RWwn+27	Monitor code 2		53
RWwn+28	Monitor code 3		53
RWwn+29	Monitor code 4		53
RWwn+2A	Monitor code 5		53
RWwn+2B	Monitor code 6		53
RWwn+2C	Monitor code 7		53
RWwn+2D	Monitor code 8		53
RWwn+2E	Monitor code 9		53
RWwn+2F	Monitor code 10		53
RWwn+30 to RWwn+34	Reserved		—

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn+1A	Reply code		55
RWrn+1B	Read data*2		55
RWrn+1C to RWrn+1F	Reserved		—
RWrn+20	Error status		55
RWrn+21	Faults history No.	Fault record (fault data)	55
RWrn+22	Fault record (output frequency)		55
RWrn+23	Fault record (output current)		55
RWrn+24	Fault record (output voltage)		55
RWrn+25	Fault record (energization time)		56
RWrn+26	First monitor value		56
RWrn+27	Second monitor value		56
RWrn+28	Third monitor value		56
RWrn+29	Fourth monitor value		56
RWrn+2A	Fifth monitor value		56
RWrn+2B	Sixth monitor value		56
RWrn+2C	Seventh monitor value		56
RWrn+2D	Eighth monitor value		56
RWrn+2E	Ninth monitor value		56
RWrn+2F	Tenth monitor value		56
RWrn+30	Output frequency		56
RWrn+31	Reserved		—
RWrn+32	output current		56
RWrn+33	output voltage		56
RWrn+34	Reserved		—

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn+35 to RWwn+52	Reserved		—

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn+35	Frequency setting value		*56*
RWrn+36	Running speed		*56*
RWrn+37	Motor torque		*56*
RWrn+38	Converter output voltage		*56*
RWrn+39	Regenerative brake duty		*56*
RWrn+3A	Electric thermal relay function load factor		*56*
RWrn+3B	Output current peak value		*56*
RWrn+3C	Converter output voltage peak value		*56*
RWrn+3D	Input power		*56*
RWrn+3E	Output power		*56*
RWrn+3F	Input terminal status		*56*
RWrn+40	Output terminal status		*56*
RWrn+41	Load meter		*56*
RWrn+42	Motor excitation current		*56*
RWrn+43	Position pulse		*56*
RWrn+44	Cumulative energization time		*56*
RWrn+45	Reserved		—
RWrn+46	Orientation status		*56*
RWrn+47	Actual operation time		*56*
RWrn+48	Motor load factor		*56*
RWrn+49	Cumulative power		*56*
RWrn+4A to RWrn+4F	Reserved		—
RWrn+50	Torque command		*56*
RWrn+51	Torque current command		*56*
RWrn+52	Motor output		*56*

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWwn+53 to RWwn+7F	Reserved		—

Address	Description		Refer to Page
	Upper 8 Bits	Lower 8 Bits	
RWrn+53	Feedback pulse		*56*
RWrn+54 to RWrn+5D	Reserved		—
RWrn+5E	Motor temperature monitor output		*56*
RWrn+5F to RWrn+61	Reserved		—
RWrn+62	Power saving effect		*56*
RWrn+63	Cumulative saving power		*56*
RWrn+64	PID set point		*56*
RWrn+65	PID measured value		*56*
RWrn+66	PID deviation		*56*
RWrn+67 to RWrn+69	Reserved		—
RWrn+6A	Option input terminal status 1		*56*
RWrn+6B	Option input terminal status 2		*56*
RWrn+6C	Option output terminal status		*56*
RWrn+6D to RWrn+7F	Reserved		—

("n" indicates a value determined according to the station number setting.)

*1 When *Pr. 128* = "50, 51, 60, 61", they are valid.

*2 Instructions will be processed in the order they are received. Thus, the read value of an instruction may differ at different timings if other writing requests are being made.

7 DETAILS OF I/O SIGNALS

The following device No. are those for station 1.
For stations 2 and later, the device No. are different. (Refer to *the master module manual* for correspondence between the device No. and station number)

7.1 Details of remote input and output signals

7.1.1 Output signals (master module to inverter (FR-A7NCE))

The output signals from the master module are indicated. (Input signals to inverter)

Device No.	Signal	Description	
RY0	Forward rotation command *2	0 : Stop command 1 : Forward rotation start	When "1" is set, a start command is input to the inverter.
RY1	Reverse rotation command *2	0 : Stop command 1 : Reverse rotation start	When "1" is set in RY0 and RY1, a stop command is input.
RY2	High-speed operation command (terminal RH function) *1	Functions assigned to terminals RH, RM, RL, JOG, RT, AU, CS, MRS, STOP and RES are activated.	
RY3	Middle-speed operation command (terminal RM function) *1		
RY4	Low-speed operation command (terminal RL function) *1		
RY5	Jog operation command (terminal JOG function) *1		
RY6	Second function selection (terminal RT function) *1		
RY7	Current input selection (terminal AU function) *1		
RY8	Selection of automatic restart after instantaneous power failure (terminal CS function) *1		
RY9	Output stop (terminal MRS function) *1		
RYA	Start self-holding selection (terminal STOP function) *1		
RYB	Reset (RES terminal function) *1		

*1 Signal names are initial values. Using *Pr. 180* to *Pr .189*, you can change input signal functions. Note that some of signals do not accept a command from the network according to the *Pr. 338* and *Pr. 339* settings. For example, RYB reset (terminal RES function) cannot be controlled via network. Refer to *the inverter manual* for the details of *Pr.180* to *Pr.189*, *Pr.338*, and *Pr.339*.

*2 Signals of the RY0 and RY1 cannot be changed. Even when changed using *Pr. 178* and *Pr. 179*, the settings are invalid. Refer to *the inverter manual* for details of *Pr. 178* and *Pr.179*.

Device No.	Signal	Description
RY20	Monitor command	When "1" is set in the monitor command (RY20), the monitored value is set in the remote register RWr26 to 2F, and "1" is set in the monitoring (RX20). While "1" is set in the monitor command (RY20), the monitored data is always updated.
RY21	Frequency setting command (RAM)	When "1" is set in the frequency setting command (RY21), the set frequency (RWw0) is written to RAM of the inverter. *3 After the writing completes, "1" is set in the frequency setting completion (RX21).
RY22	Frequency setting command (RAM, EEPROM)	When "1" is set in the frequency setting command (RY22), the set frequency (RWw0) is written to RAM and EEPROM of the inverter. After the writing completes, "1" is set in the frequency setting completion (RX22). To change the frequency consecutively, be sure to write data only to the inverter RAM (RY21). Writing to EEPROM frequently will shorten the life of EEPROM.
RY23	Torque command (RAM)	When "1" is set in the torque command (RY23), the torque command (RWw2) is written to RAM of the inverter. After the writing completes, "1" is set in the torque command setting completion (RX23).
RY24	Torque command (RAM, EEPROM)	When "1" is set in the torque command (RY24), the torque command value (RWw2) is written to RAM and EEPROM of the inverter. After the writing completes, "1" is set in the torque command setting completion (RX24). To change the torque command value consecutively, be sure to write data only to the inverter RAM (RY23). Writing to EEPROM frequently will shorten the life of EEPROM.
RY25	Instruction code execution request	When "1" is set in the instruction code execution request (RY25), processes corresponding to the instruction codes set to RWw10, 12, 14, 16, 18 and 1A are executed. "1" is set in the instruction code execution request (RX25) after completion of instruction codes. When an instruction code execution error occurs, a value other than "0" is set in the reply code (RWr10, 12, 14, 16, 18 and 1A).
RY3A	Error reset request flag	When "1" is set in the error reset request flag (RY3A) at an inverter fault, the inverter is reset, then "0" is set in the error status flag (RX3A). *4

*3 While "1" is set in the frequency setting command (RY21), the set frequency (RWw0) is always applied.

*4 Refer to *page 31* for operation conditions of inverter reset.

7.1.2 Input signals (inverter (FR-A7NCE) to master module)

The input signals to the master module are indicated. (Output signals from inverter)

Device No.	Signal	Description
RX0	Forward running	0 : Other than forward running (during stop or reverse rotation) 1 : Forward running
RX1	Reverse running	0 : Other than reverse running (during stop or forward rotation) 1 : Reverse running
RX2	Running (terminal RUN function) *1	Functions assigned to terminals RUN, SU, OL, IPF, FU, ABC1 and ABC2 activate. Refer to *page 49* for signals which can be assigned.
RX3	Up to frequency (terminal SU function) *1	
RX4	Overload alarm (terminal OL function) *1	
RX5	Instantaneous power failure (terminal IPF function) *1	
RX6	Frequency detection (terminal FU function) *1	
RX7	Fault (terminal ABC1 function) *1	
RX8	— (terminal ABC2 function) *2	
RX10	— (DO0 function) *2	Functions assigned to *Pr. 313* to *Pr. 315* are activated. Refer to *page 49* for signals which can be assigned.
RX11	— (DO1 function) *2	
RX12	— (DO2 function) *2	
RX20	Monitoring	After "1" is set in the monitor command (RY20), and the monitored value is set in the remote register RWr26 to 2F, "1" is set in this signal. When "0" is set in the monitor command (RY20), "0" is set in this signal.

*1 Signal names are initial values. Using *Pr. 190* to *Pr .196*, you can change output signal functions.
Refer to *the inverter manual* for details of *Pr. 190* to *Pr.196*.

*2 Signals are not assigned in the initial setting.
Refer to *Pr. 190* to *Pr. 196* of *the inverter manual* for details of signals.

Device No.	Signal	Description
RX21	Frequency setting completion (RAM)	After "1" is set in the frequency setting command (RY21) and the set frequency is written to the inverter RAM, "1" is set in this signal. When "0" is set in the frequency setting command (RY21), "0" is set in this signal.
RX22	Frequency setting completion (RAM, EEPROM)	After "1" is set in the frequency setting command (RY22) and the set frequency is written to the inverter RAM and EEPROM, "1" is set in this signal. When "0" is set in the frequency setting command (RY22), "0" is set in this signal.
RX23	Torque command setting completion (RAM)	After "1" is set in the torque command (RY23) and the torque command value is written to the inverter RAM, "1" is set in this signal. When "0" is set in the torque command (RY23), "0" is set in this signal.
RX24	Torque command setting completion (RAM, EEPROM)	After "1" is set in the torque command (RY24) and the torque command value is written to the inverter RAM and EEPROM, "1" is set in this signal. When "0" is set in the torque command (RY24), "0" is set in this signal.
RX25	Instruction code execution completion	After "1" is set in the instruction code execution request (RY25) and the processes corresponding to the instruction codes (RWw10, 12, 14, 16, 18 and 1A) are executed, "1" is set in this signal. When "0" is set in the instruction code execution request (RY25), "0" is set in this signal.
RX3A	Error status flag	When an inverter error occurs (protective function is activated), "1" is set in this signal.
RX3B	Remote station ready	When the inverter goes into the ready status upon completion of initial setting after power-on or hardware reset, "1" is set in this signal. When an inverter error occurs (protective function is activated), "0" is set in this signal. The signal is used as an interlock signal during the write to/read from the master module.

●Output signal list

The following signals can be assigned to RX2 to RX8 and RX10 to RX12 using *Pr.190 to Pr.196* and *Pr.313 to Pr.315* respectively. Refer to the description of *Pr.190 to Pr.196* (output terminal function selection) in the inverter manual for the signal details.

Setting		Signal Name	Function
Positive Logic	Negative Logic		
0	100	RUN	Inverter running
1	101	SU	Up to frequency
2	102	IPF	Instantaneous power failure/ undervoltage
3	103	OL	Overload alarm
4	104	FU	Output frequency detection
5	105	FU2	Second output frequency detection
6	106	FU3	Third output frequency detection
7	107	RBP	Regenerative brake pre-alarm
8	108	THP	Electronic thermal O/L relay pre-alarm
10	110	PU	PU operation mode
11	111	RY	Inverter operation ready
12	112	Y12	Output current detection
13	113	Y13	Zero current detection
14	114	FDN	PID lower limit
15	115	FUP	PID upper limit
16	116	RL	PID forward/reverse rotation output
17	—	MC1	Electronic bypass MC1
18	—	MC2	Electronic bypass MC2
19	—	MC3	Electronic bypass MC3

Setting		Signal Name	Function
Positive Logic	Negative Logic		
20	120	BOF	Brake opening request
25	125	FAN	Fan fault output
26	126	FIN	Heatsink overheat pre-alarm
27	127	ORA	Orientation complete
28	128	ORM	Orientation fault
30	130	Y30	Forward rotation output
31	131	Y31	Reverse rotation output
32	132	Y32	Regenerative status output
33	133	RY2	Operation ready 2
34	134	LS	Low speed output
35	135	TU	Torque detection
36	136	Y36	In-position
39	139	Y39	Start time tuning completion
41	141	FB	Speed detection
42	142	FB2	Second speed detection
43	143	FB3	Third speed detection
44	144	RUN2	Inverter running 2
45	145	RUN3	Inverter running and start command is on
46	146	Y46	During deceleration at occurrence of power failure
47	147	PID	During PID control activated
64	164	Y64	During retry

Setting		Signal Name	Function
Positive Logic	Negative Logic		
70	170	SLEEP	PID output interruption
84	184	RDY	Position control preparation ready
85	185	Y85	DC feeding
86	186	Y86	Control circuit capacitor life *
87	187	Y87	Main circuit capacitor life *
88	188	Y88	Cooling fan life *
89	189	Y89	Inrush current limit circuit life *
90	190	Y90	Life alarm
91	191	Y91	Fault output 3 (power-off signal)
92	192	Y92	Energy saving average value updated timing
93	193	Y93	Current average value monitor signal
94	194	ALM2	Fault output 2
95	195	Y95	Maintenance timer signal
96	196	REM	Remote output
97	197	ER	Alarm output 2
98	198	LF	Alarm output
99	199	ALM	Fault output
9999		—	No function

* These signals cannot be assigned with *Pr.190 to Pr.196*.

7.2 Details of remote register

7.2.1 Remote register (master module to inverter (FR-A7NCE))

●Remote register definition

Device No.	Signal	Description
RWw0	Set frequency *1, *2	· Specify the set frequency or rotations per minute (machine speed). At this time, whether to write to RAM or EEPROM is decided with the RY21 and RY22 settings. After setting the set frequency in this register, set "1" in RY21 or RY22 to write the frequency. After writing of frequency is completed, "1" is set in RX21 or RX22 in response to the input command. · The setting range is 0 to 400.00Hz (0.01Hz increments). Write "40000" when setting 400.00Hz.
RWw2	Torque command value	Specify the torque command value. Set *Pr.804 Torque command source selection* = "1, 3, 5, or 6" to activate this signal under torque control, such as Real sensorless vector control and vector control. The value is written to the inverter either by RY23 or RY24. *Pr.805 Torque command value (RAM)* and *Pr.806 Torque command value (RAM,EEPROM)* are updated as well. The setting range and setting increments depend on the *Pr.804* setting.

*1 Setting increment differs according to the combination of *Pr.37*, *Pr.144*, and *Pr.811*.
Refer to *the inverter manual* for the details.

*2 When *Pr.541 Frequency command sign selection (CC-Link)* = 1, the setting value has either + or -. When the setting value is negative, the command is inversed from starting command.
Setting range: -327.68Hz to 327.67Hz (-327.68 to 327.67) 0.01Hz increments.
For details refer to *page 34*.

Device No.	Signal	Description	
RWw4	PID set point *3	Set the PID set point Setting range : "0 to 100.00%"	· Input a value 100 times greater than the value to be set. For example, input "10000" when setting 100.00%. · Refer to *the inverter manual* for details of PID control.
RWw5	PID measured value *3	Set the PID measured value Setting range : "0 to 100.00%"	
RWw6	PID deviation *3	Set the PID deviation. Setting range : "-100.00% to 100.00%"	
RWw10, RWw12, RWw14, RWw16, RWw18, RWw1A	Link parameter extended setting/ Instruction code	Set the instruction code *(refer to page 57)* for execution of operation mode rewrite, parameter read/write, error reference, error clear, etc. The instructions are executed in the following order by setting "1" in RY25 after completing the register setting: RWw10, 12, 14, 16, 18, then 1A. After completing the execution up to RWw1A, "1" is set in RX25. Set HFFFF to disable an instruction by RWw10 to 1A. The first 8 bits are link parameter extended setting. Example) When reading *Pr. 160*, instruction code is H0200.	
RWw11, RWw13, RWw15, RWw17, RWw19, RWw1B	Write data	Set the data specified by the instruction code of RWw10, 12, 14, 16, 18 and 1A. (when required) RWw10 and 11, 12 and 13, 14 and 15, 16 and 17, 18 and 19, and 1A and 1B correspond each other. Set "1" in RY25 after setting the instruction codes (RWw10, 12, 14, 16, 18 and 1A) and the corresponding register. Set "0" when the write code is not required.	

*3 When *Pr. 128* = "50, 51, 60, 61", they are valid. If the data outside the range is set, the previous setting is retained. Refer to *the inverter manual* for details of *Pr.128*.

Device No.	Signal	Description
RWw21	Faults history No.*4	Set the individual fault number of the faults history that you want to read. Up to the 8th previous fault can be read. Last two digits: H00 (most recent fault) to H07 (8th most recent fault) Set H08 to HFF to make the faults history No. to "0."
RWw26	Monitor code 1*4	Set the monitor code to be monitored. By setting "1" in RY20 after setting, the specified monitored data is stored in RWr☐. (☐ indicates a register number. (RWr26 to 2F)) (Refer to *page 62* for monitor code details.)
RWw27	Monitor code 2*4	
RWw28	Monitor code 3*4	
RWw29	Monitor code 4*4	
RWw2A	Monitor code 5*4	
RWw2B	Monitor code 6*4	
RWw2C	Monitor code 7*4	
RWw2D	Monitor code 8*4	
RWw2E	Monitor code 9*4	
RWw2F	Monitor code 10*4	

*4 Write data is in hexadecimal, and only two digits are valid. (The upper two digits are ignored.)

7.2.2 Remote register (inverter (FR-A7NCE) to master module)

(1) Remote register definition

<table>
<tr><th>Device No.</th><th>Signal</th><th>Description</th></tr>
<tr><td>RWr0</td><td>Reply code</td><td>When "1" is set in RY21 or RY22, the following reply codes are set for the frequency setting command. The setting value "0" is set normally, and a value other than "0" is set at an error.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>H0000</td><td>Normal</td></tr>
<tr><td>H0001</td><td>Write mode fault</td></tr>
<tr><td>H0003</td><td>Setting range fault</td></tr>
</table></td></tr>
<tr><td>RWr2</td><td>Reply code</td><td>When "1" is set in RY23 or RY24, the following reply codes are set for the torque command. The setting value "0" is set normally, and a value other than "0" is set at an error.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>H0000</td><td>Normal</td></tr>
<tr><td>H0003</td><td>Setting range fault</td></tr>
</table></td></tr>
<tr><td>RWr4,
RWr5,
RWr6</td><td>Reply code</td><td>When the PID command (RWw4 to RWw6) is set, the following reply code is set for the PID command. The setting value "0" is set normally, and a value other than "0" is set at an error.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>H0000</td><td>Normal</td></tr>
<tr><td>H0003</td><td>Setting range fault</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Device No.</th><th>Signal</th><th>Description</th></tr>
<tr><td>RWr10,
RWr12,
RWr14,
RWr16,
RWr18,
RWr1A</td><td>Reply code</td><td>When "1" is set in RY25, the following reply codes corresponding to the instruction code RWw10, 12, 14, 16, 18, and 1A are set. The setting value "0" is set normally, and a value other than "0" is set at an error.<table><tr><th>Value</th><th>Description</th></tr><tr><td>H0000</td><td>Normal</td></tr><tr><td>H0001</td><td>Write mode fault</td></tr><tr><td>H0002</td><td>Parameter selection fault</td></tr><tr><td>H0003</td><td>Setting range fault</td></tr></table></td></tr>
<tr><td>RWr11,
RWr13,
RWr15,
RWr17,
RWr19,
RWr1B</td><td>Reply code</td><td>For a normal reply, the reply data to the instruction specified by the instruction code is set.</td></tr>
<tr><td>RWr20</td><td>Error status</td><td>The setting value "0" is set during normal inverter operation, and the corresponding error code is set at an error. (Refer to page 61 for the error codes.)</td></tr>
<tr><td>RWr21</td><td>Fault record
(fault data)</td><td>The fault data of faults history No. specified by RWw21 is stored in the lower 8bits. Lower 8 bits of RWw21 will be reverted back to the upper 8 bits.</td></tr>
<tr><td>RWr22</td><td>Fault record
(output frequency)</td><td>Output frequency of the faults history No. specified in RWw21 is stored.</td></tr>
<tr><td>RWr23</td><td>Fault record
(output current)</td><td>Output current of the faults history No. specified in RWw21 is stored.</td></tr>
<tr><td>RWr24</td><td>Fault record
(output voltage)</td><td>Output voltage of the faults history No. specified in RWw21 is stored.</td></tr>
</table>

Device No.	Signal	Description
RWr25	Fault record (energization time)	Energization time of the faults history No. specified in RWw21 is stored.
RWr26	First monitor value	When "1" is set in RY20, the monitored data specified by the monitor code (RWw☐) is saved. (☐ indicates a register number (RWw26 to 2F)) Output frequency, output current, and output voltage monitors are held at an inverter failure.
RWr27	Second monitor value	
RWr28	Third monitor value	
RWr29	Fourth monitor value	
RWr2A	Fifth monitor value	
RWr2B	Sixth monitor value	
RWr2C	Seventh monitor value	
RWr2D	Eighth monitor value	
RWr2E	Ninth monitor value	
RWr2F	Tenth monitor value	
RWr30 to RWr7F	Monitor value	Fixed monitored data are saved regardless of the RY20 setting. Output frequency, output current, and output voltage monitors are held at an inverter failure.

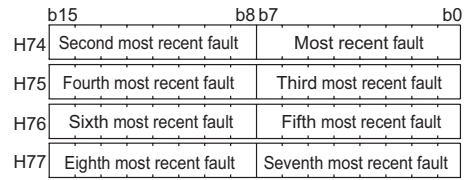
7.2.3 Instruction codes

(1) Instruction code definition

Set the instruction code using a remote register (RWw) *(Refer to page 51.)*
The definition read by the instruction code is stored in the remote register (RWr). *(Refer to page 54.)*

Item		Read/ Write	Code Number	Description
Operation mode		Read	H7B	H0000: Network operation mode H0001: External operation mode, External JOG operation mode H0002: PU operation mode, External/PU combined operation modes 1 and 2, PUJOG operation mode
		Write	HFB	H0000: Network operation mode H0001: External operation mode H0002: PU operation mode (*Pr. 79* = "6")
Monitor	Output frequency *1, *2	Read	H6F	H0000 to HFFFF: Running frequency .....0.01Hz increments Speed (machine speed) .....1 increments *3
	Output current	Read	H70	H0000 to HFFFF: Output current (hexadecimal) Increments 0.01A (55K or lower) / 0.1A (75K or higher) *4
	Output voltage	Read	H71	H0000 to HFFFF: Output voltage (hexadecimal) Increments 0.1V
	Special monitor	Read	H72	H0000 to HFFFF: Check the data of the monitor selected by the instruction code H00F3.
	Special monitor selection No.	Read	H73	H01 to H3C: Monitor selection data Refer to monitor code. *(Refer to page 62.)*
		Write	HF3 *5	

*1 When "100" is set in *Pr. 52 DU/PU main display data selection*, set frequency is monitored during a stop and output frequency is monitored during running.
*2 When a value other than 9999 is set in *Pr.430* under position control (*Pr.800* = 3), pulse monitor is selected.
*3 Displayed increments differ according to the combination of *Pr.37*, *Pr.144*, and *Pr.811*. For the details, refer to *the inverter manual*.
*4 The inverter models 55K and 75K differ according to -NA and -EC versions. *(Refer to page 1.)*
*5 Write data is in hexadecimal, and only two digits are valid. (The upper two digits are ignored.)

<table>
<tr><th colspan="2">Item</th><th>Read/ Write</th><th>Code Number</th><th>Description</th></tr>
<tr><td>Monitor</td><td>Faults history</td><td>Read</td><td>H74 to H77</td><td>H0000 to HFFFF: Last two fault records
 

Refer to the fault data table (page 61)</td></tr>
<tr><td colspan="2">Set frequency (RAM)</td><td rowspan="2">Read</td><td>H6D</td><td rowspan="2">Read set frequency/speed (machine speed) from RAM or EEPROM.
H0000 to HFFFF:
Set frequency .....0.01Hz increments
Speed (machine speed) .....1 increments *7</td></tr>
<tr><td colspan="2">Set frequency (EEPROM)</td><td>H6E</td></tr>
<tr><td colspan="2">Set frequency (RAM) *6</td><td>Write</td><td>HED</td><td rowspan="2">Write set frequency/speed (machine speed) to RAM or EEPROM.
· H0000 to H9C40 (0 to 400.00Hz) :
Frequency.....0.01Hz increments
· H0000 to H270E (0 to 9998) :
Speed (machine speed).....1 increments *7
· To change the set frequency consecutively, write data to the inverter RAM. (Instruction code: HED)</td></tr>
<tr><td colspan="2">Set frequency
(RAM and EEPROM) *6</td><td>Write</td><td>HEE</td></tr>
</table>

*6 Setting from remote registers (RWw0) can be made.
*7 Displayed increments differ according to the combination of *Pr.37*, *Pr.144*, and *Pr.811*.
For the details, refer to *the inverter manual*.

<table>
<tr><th>Item</th><th>Read/ Write</th><th>Code Number</th><th>Description</th></tr>
<tr><td rowspan="2">Parameter</td><td>Read</td><td>H00 to H63</td><td rowspan="2">· Refer to the instruction code in the parameter list in the inverter manual to read and write as required.
Write to Pr. 77 and Pr. 79 is disabled.
When setting Pr.100 and later, set link parameter extended setting.
· Set 65520 (HFFF0) as a parameter value "8888" and 65535 (HFFFF) as "9999".
· When changing the parameter values frequently, set "1" in Pr. 342 to write them to the RAM. (Refer to Chapter 4 of the inverter manual for the details of Pr.342.)</td></tr>
<tr><td>Write</td><td>H80 to HE3</td></tr>
<tr><td>Faults history batch clear</td><td>Write</td><td>HF4</td><td>H9696: Clears the faults history as a batch.</td></tr>
<tr><td>Parameter clear
All parameter clear</td><td>Write</td><td>HFC</td><td>All parameters return to the initial values.
Whether to clear communication parameters or not can be selected according to data. (○: Clear, ×: Not clear)
Refer to the inverter manual for parameter clear, all clear, and communication parameters.
<table>
<tr><th>Clear Type</th><th>Data</th><th>Communication Pr.</th></tr>
<tr><td rowspan="2">Parameter clear</td><td>H9696</td><td>○</td></tr>
<tr><td>H5A5A</td><td>× *8</td></tr>
<tr><td rowspan="2">All parameter clear</td><td>H9966</td><td>○</td></tr>
<tr><td>H55AA</td><td>× *8</td></tr>
</table>
When clear is executed for H9696 or H9966, communication-related parameter settings also return to the initial values. When resuming operation, set the parameters again.
Executing clear will clear the instruction code H00EC, H00F3, and H00FF settings.</td></tr>
</table>

*8 Turning OFF the power supply while clearing parameters with H5A5A or H55AA sets back the communication parameter settings back to the initial settings.

Item	Read/ Write	Code Number	Description
Inverter reset	Write	HFD	H9696: Resets the inverter.
Second parameter changing *9	Read	H6C	Read or write of bias and gain parameters (instruction codes H5E to H61 and HDE to HE1 with the link parameter extended setting = "1", H11 to H21 and H91 to HA1 with the link parameter extended setting = "9"). H00: Frequency *10 H01: Analog value set in parameters H02: Analog value input from the terminal
	Write	HEC	

*9 Setting can be made when the link parameter extended setting = "1, 9".
*10 Gain frequencies can be written using *Pr. 125* (instruction code H99) and *Pr. 126* (instruction code H9A) also.

(2) Fault data

Refer to *the inverter manual* for details of fault definitions.

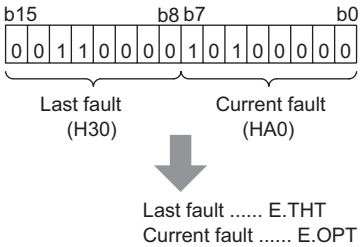
Data	Definition
H00	No alarm
H10	E.OC1
H11	E.OC2
H12	E.OC3
H20	E.OV1
H21	E.OV2
H22	E.OV3
H30	E.THT
H31	E.THM
H40	E.FIN
H50	E.IPF
H51	E.UVT
H52	E.ILF
H60	E.OLT
H70	E.BE
H80	E.GF
H81	E.LF
H90	E.OHT

Data	Definition
H91	E.PTC
HA0	E.OPT
HA3	E.OP3
HB0	E.PE
HB1	E.PUE
HB2	E.RET
HB3	E.PE2
HC0	E.CPU
HC1	E.CTE
HC2	E.P24
HC4	E.CDO
HC5	E.IOH
HC6	E.SER
HC7	E.AIE
HC8	E.USB
HD0	E.OS
HD1	E.OSD
HD2	E.ECT

Data	Definition
HD3	E.OD
HD5	E.MB1
HD6	E.MB2
HD7	E.MB3
HD8	E.MB4
HD9	E.MB5
HDA	E.MB6
HDB	E.MB7
HDC	E.EP
HF1	E.1
HF2	E.2
HF3	E.3
HF5	E.5
HF6	E.6
HF7	E.7
HFB	E.11
HFD	E.13

Fault record display example
(instruction code H74)

For read data H30A0



7.2.4 Monitor codes

The following table lists the monitored items, which can be selected by the dedicated monitor selection Nos. of instruction codes and the remote registers RWw26 to 2F.

Code Number	Monitor Description	Increments
H00	No monitoring (monitor value is 0)	—
H01	Output frequency *1, *9	0.01Hz *1
H02	Output current	0.01A / 0.1A *2
H03	Output voltage	0.1V
H04	No monitoring (monitor value is 0)	—
H05	Frequency setting value *1	0.01Hz *1
H06	Running speed *1	r/min *1
H07	Motor torque	0.1%
H08	Converter output voltage	0.1V
H09	Regenerative brake duty	0.1%
H0A	Electronic thermal relay function load factor	0.1%
H0B	Output current peak value	0.01A / 0.1A *2
H0C	Converter output voltage peak value	0.1V
H0D	Input power	0.01kW / 0.1kW *2
H0E	Output power	0.01kW / 0.1kW *2
H0F	Input terminal status *4	—
H10	Output terminal status *5	—
H11	Load meter	0.1%
H12	Motor excitation current	0.01A / 0.1A *2
H13	Position pulse *3	—
H14	Cumulative energization time	1h
H15	No monitoring (monitor value is 0)	—
H16	Orientation status *3	—
H17	Actual operation time	1h
H18	Motor load factor	0.1%
H19	Cumulative power	1kWh
H1A to H1F	No monitoring (monitor value is 0)	—
H20	Torque command	0.1%
H21	Torque current command	0.1%
H22	Motor output	0.01kW / 0.1kW *2
H23	Feedback pulse *3	—
H24 to H2D	No monitoring (monitor value is 0)	—
H2E	Motor temperature monitor output	1°C
H2F to H31	No monitoring (monitor value is 0)	—
H32	Power saving effect	Variable according to parameters
H33	Cumulative saving power	Variable according to parameters
H34	PID set point	0.1%
H35	PID measured value	0.1%
H36	PID deviation	0.1%
H37 to H39	No monitoring (monitor value is 0)	—
H3A	Option input terminal state1 *6	—
H3B	Option input terminal state2 *7	—
H3C	Option output terminal status *8	—

*1 The displayed increments of the frequency monitor, which are specified by the dedicated monitor selection No. of an instruction doe, differ by the combination of *Pr.37*, *Pr.144*, and *Pr.811*. Refer to *the inverter manual* for the details.

*2 The setting depends on the inverter capacity. (55K or lower/75K or higher)
The inverter models 55K and 75K differ according to -NA and -EC versions. *(Refer to page 1.)*

*3 Available only when the FR-A7AP is mounted.

*4 Input terminal monitor details

b15															b0
—	—	—	—	CS	RES	STOP	MRS	JOG	RH	RM	RL	RT	AU	STR	STF

*5 Output terminal monitor details

b15															b0
—	—	—	—	—	—	—	—	—	ABC2	ABC1	FU	OL	IPF	SU	RUN

*6 Details of option input terminal monitor 1 (input terminal status of FR-A7AX)
—all terminals are off when an option is not fitted.

b15															b0
X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0

*7 Details of option input terminal monitor 2 (input terminal status of FR-A7AX)
—all terminals are off when an option is not fitted.

b15															b0
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	DY

*8 Details of option output terminal monitor (output terminal status of FR-A7AY/A7AR)
—all terminals are off when an option is not fitted.

b15															b0
—	—	—	—	—	—	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0

*9 When a value other than "9999" is set in *Pr.430* under position control (*Pr.800* = 3), pulse monitor is selected.

7.3 Torque command by CC-Link IE Field Network communication

Torque commands can be given via CC-Link IE Field Network under Real sensorless vector control or vector control.

Parameter No.	Name	Initial Value	Setting Range	Definition
804	Torque command source selection	0	0	Torque command by terminal1 analog input
			3, (1)	Torque command through CC-Link IE Field Network communication (FR-A7NCE). · Torque command (-400% to 400%) by the parameter setting (*Pr.805* or *Pr.806*) · Torque command (-400% to 400%) by the RWw2 remote register setting
			2	Torque command by the pulse train input (FR-A7AL)
			4	16-bit digital input (FR-A7AX)
			5, (6)	Torque command through CC-Link IE Field Network communication (FR-A7NCE). · Torque command (-327.68% to 327.67%) by the parameter setting (*Pr.805* or *Pr.806*) · Torque command (-327.68% to 327.67%) by the RWw2 remote register setting

REMARKS

· Setting *Pr.804* to "3" results in the same operation with setting *Pr.804* to "1", and setting to "5" results in the same operation with setting "6".

(1) Torque command setting method

Pr.804 Setting	Torque command setting method (Any method below can be chosen)
3, 5, (1, 6)	1) Set the torque command value in RWw2 and turn on either RY23 or RY24. 2) Setting is performed in the following procedure. (Writing of *Pr.805* and *Pr.806*) <Setting example> · Set link parameter extended setting = H08 for RWw10 (12, 14, 16, 18, 1A). · Set instruction codes H85 and H86 · Set the torque command value in RWw11 (13, 15, 17, 19, 1B) · Set "1" in RY25.
0, 2, 4	Torque command from CC-Link IE Field Network communication is disabled.

(2) Relationship between *Pr.804* and the setting range and actual torque command (when setting is made from CC-Link IE Field Network communication)

Pr.804 Setting	Setting Range	Actual Torque Command
1, 3	600 to 1400 (1% increments)	-400 to 400%
5, 6	-32768 to 32767 (two's complement)	-327.68 to 327.67%

(3) Speed limit

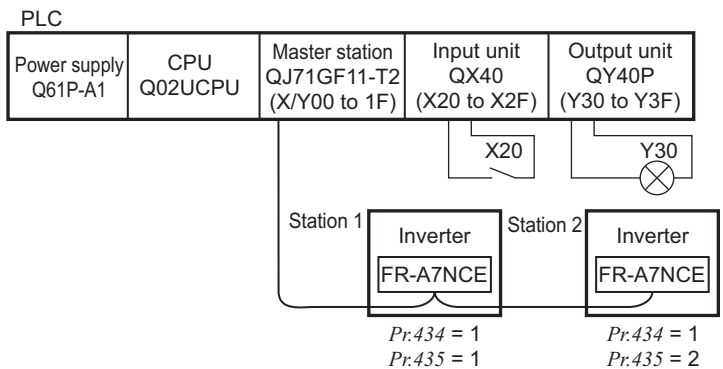
The speed is limited according to the *Pr. 807 Speed limit selection* setting, and it is not affected by the *Pr. 804* setting.
(Refer to *the inverter manual* for the details of *Pr. 807*.)

8 PROGRAMMING EXAMPLES

This chapter provides programming examples which control the inverter with sequence programs.

Item	Program Example	Refer to Page
Reading the inverter status	Reading the inverter status from the buffer memory of the master station	*70*
Setting the operation mode	Selecting the network operation mode	*71*
Setting the operation commands	Commanding the forward rotation and middle speed signals	*72*
Setting the monitoring function	Monitoring the output frequency	*73*
Reading a parameter value	Reading the value of *Pr. 7 Acceleration time*	*74*
Writing a parameter value	Setting "3.0 s" in *Pr. 7 Acceleration time*	*75*
Setting the running frequency (running speed)	Setting to 50.00Hz	*76*
Reading the fault records	Reading the inverter faults	*78*
Inverter reset	Perform inverter reset at an inverter alarm occurrence.	*79*

(1) System configuration for programming example



(2) Network parameter setting of the master station
In the programming example, network parameters are set as below.

• Network parameters (module 1)

Item	Setting condition
Network type	CC IE Field (master station)
Start I/O	0000
Network No.	1
Total stations	2
Mode	Online (standard mode)
Network configuration	*Refer to the table below.*
Refresh parameter	*Refer to page 68*

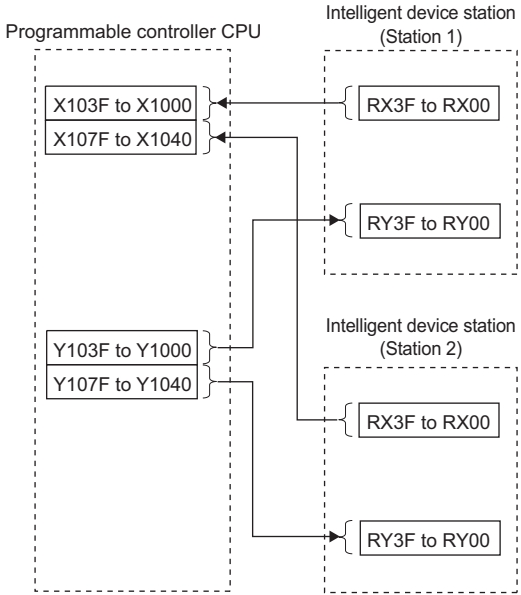
•Network configuration (assignment method: start/end)

Item		Setting condition	
		Module 1	Module 2
Station number		1	2
Station type		Intelligent device station	Intelligent device station
RX/RY setting	Start	0000	0040
	End	003F	007F
RWw/RWr setting	Start	0000	0080
	End	007F	00FF
Reserved station/error invalid station		No setting	No setting

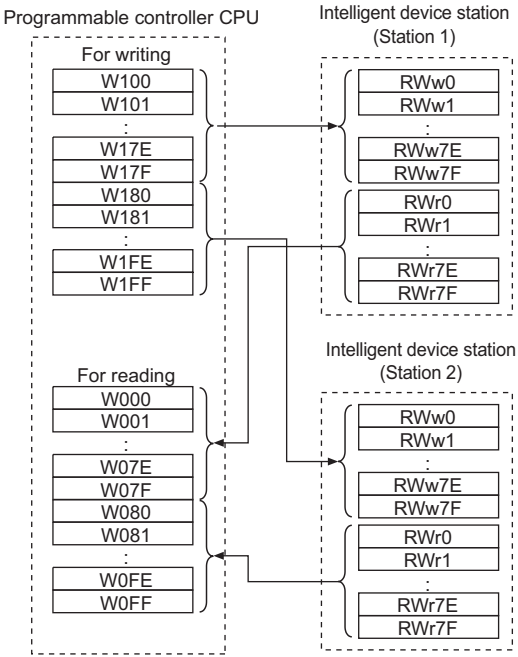
•Refresh parameters (assignment method: start/end)

Link side				Master side		
Device name	Start	End		Device name	Start	End
SB	0000	01FF	⇔	SB	0000	01FF
SW	0000	01FF	⇔	SW	0000	01FF
RX	0000	007F	⇔	X	1000	107F
RY	0000	007F	⇔	Y	1000	107F
RWr	0000	00FF	⇔	W	000000	0000FF
RWw	0000	00FF	⇔	W	000100	0001FF

(3) The following diagram shows the remote I/O (RX, RY) transmitted between the programmable controller CPU and intelligent device stations.

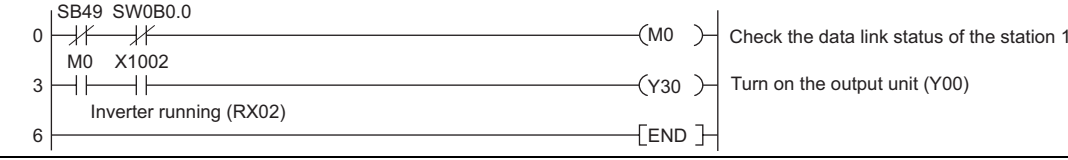


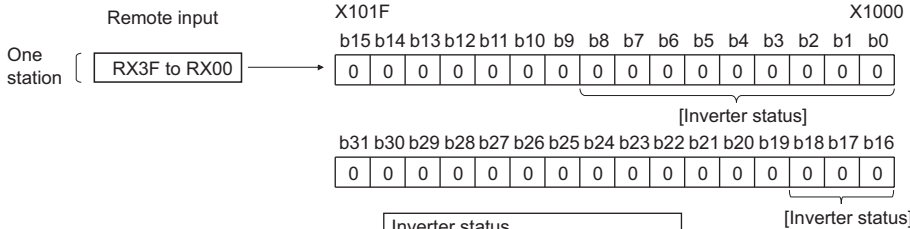
(4) The following diagram shows the remote registers (RWw, RWr) transmitted between the programmable controller CPU and intelligent device stations.



8.1 Programming example for reading the inverter status

The following program turns ON Y00 of the output unit when station 1 inverter is running.





Inverter status

b0 : During forward rotation
b1 : Reverse running
b2 : Running (RUN) *
b3 : Up to frequency (SU) *
b4 : Overload (OL) *
b5 : IPF (IPF) *
b6 : Frequency detection (FU) *
b7 : Fault (ABC1) *
b8 : — (ABC2) *
b16 : — (DO0) *
b17 : — (DO1) *
b18 : — (DO2) *

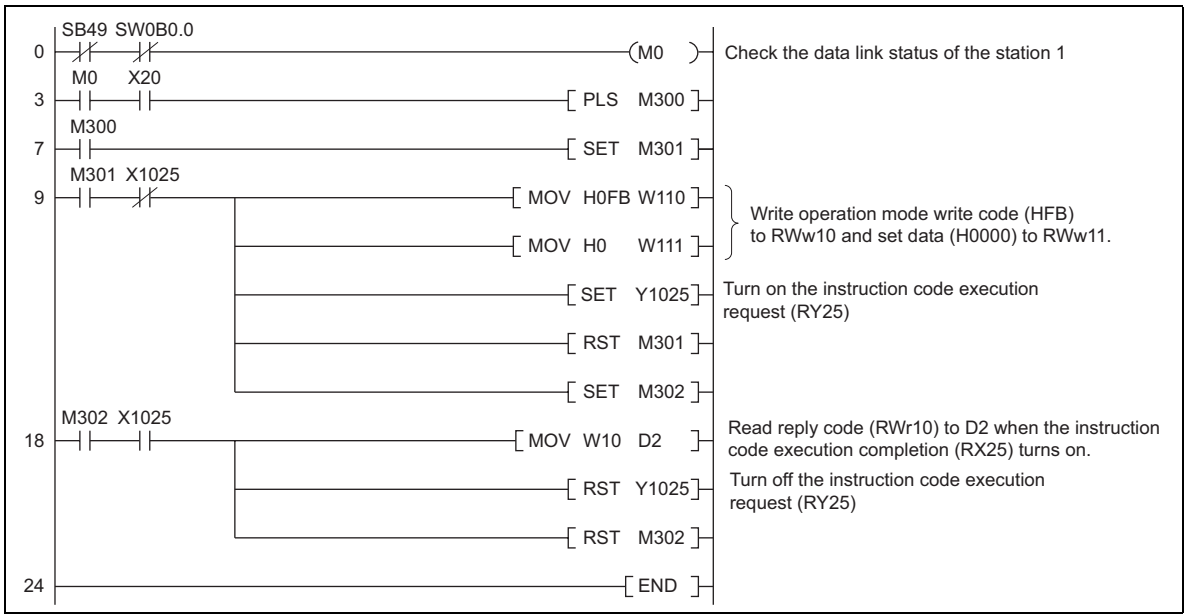
* : These signals are initial values. You can change output signals using Pr. 190 to Pr. 196, Pr.313 to Pr.315 (output terminal function selection).

8.2 Programming example for setting the operation mode

The following explains a program to write various data to the inverter.

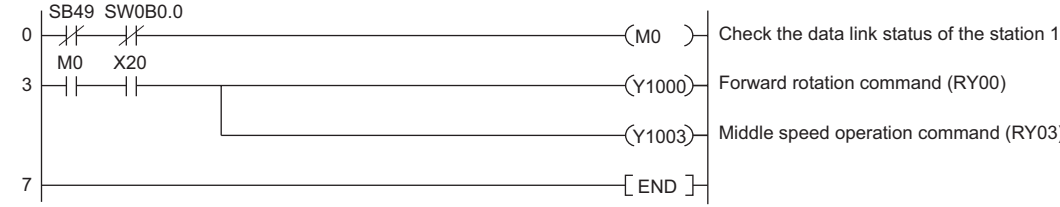
The following explains a program to change the operation mode of station 1 inverter to network operation.

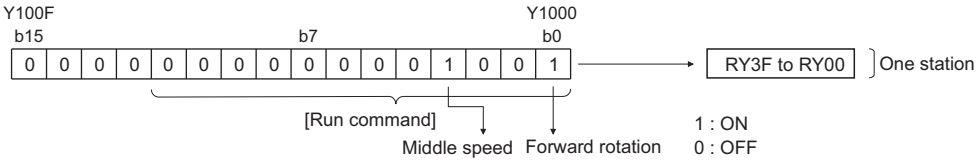
- Operation mode writing code number: HFB (hexadecimal)
- Network operation set data: H0000 (hexadecimal) *(Refer to page 57)*
- The reply code at the time of instruction code execution is set to D2. (RWr10: *Refer to page 55*)



8.3 Programming example for setting the operation commands

The following program gives a forward command and middle speed command to station 1 inverter





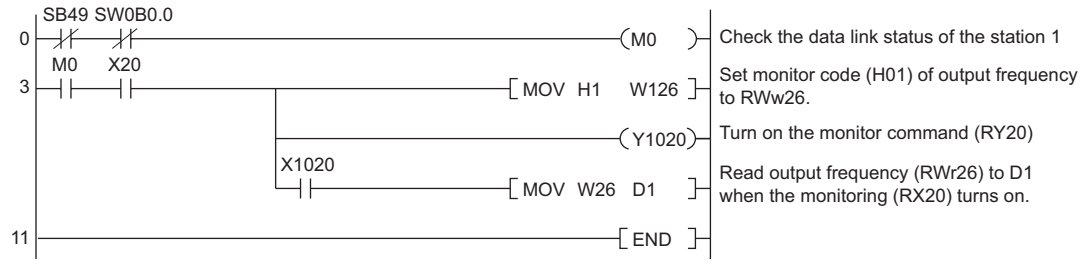
Run command	
b0 : Forward rotation command	b6 : Second function selection (RT) *
b1 : Reverse rotation command	b7 : Terminal 4 input selection (AU) *
b2 : High-speed operation command (RH) *	b8 : Selection of automatic restart after instantaneous power failure (CS) *
b3 : Middle-speed operation command (RM) *	b9 : Output stop (MRS) *
b4 : Low-speed operation command (RL) *	b10 : Start self-holding selection (STOP) *
b5 : Jog operation selection (JOG) *	b11 : Inverter reset (RES) *

* These signals are initial values. You can change input signals using *Pr. 180* to *Pr.189 (input terminal function selection)*.
Note that some of the signals do not receive a command from the programmable controller depending on the setting. (Refer to *Chapter 4 of the inverter manual* for the details.

8.4 Programming example for monitoring the output frequency

The following explains a program to read monitor functions of the inverter.

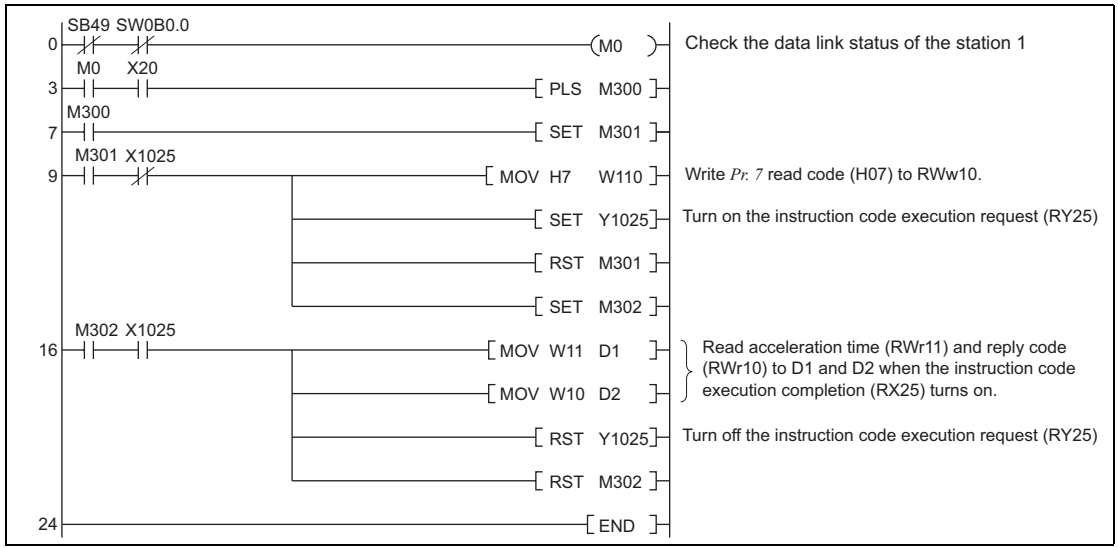
The following program reads the output frequency of station 1 inverter to D1.
Output frequency reading code number: H0001 (hexadecimal)
Refer to *page 62* for the monitor code numbers.
(Example) The output frequency of 60Hz is indicated as H1770 (6000).



8.5 Programming example for parameter reading

The following program reads *Pr. 7 Acceleration time* of station 1 inverter to D1.

- *Pr. 7 Acceleration time* reading code number: H07 (hexadecimal)
- Refer to *the inverter manual* for details of the parameter codes .
- The reply code at the time of instruction code execution is set to D2. (RWr10: *Refer to page 55*)



REMARKS

- For parameters having numbers 100 and later, change their link parameter extended settings (set them to other than H0000). Refer to *the inverter manual* for details.

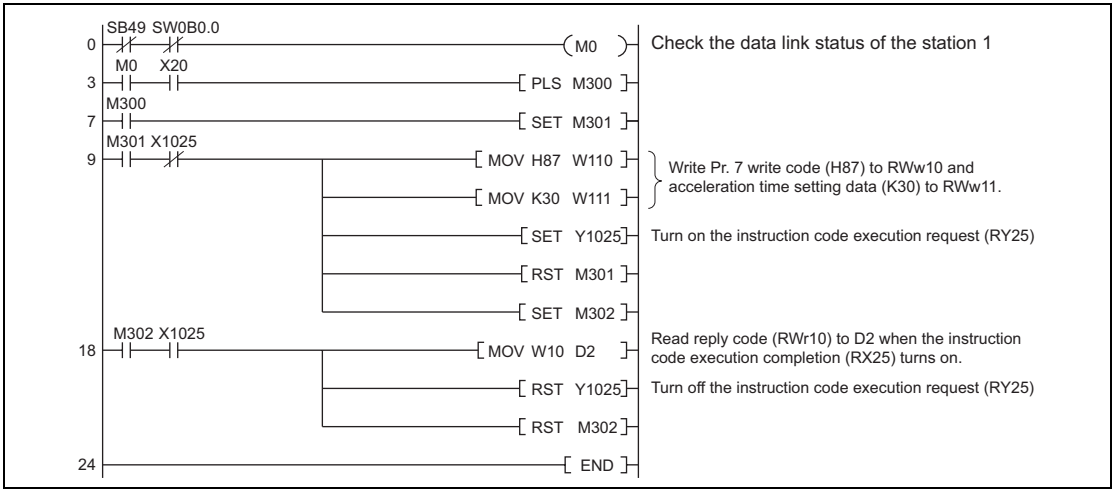
8.6 Programming example for parameter writing

The following program changes the setting of *Pr.7 Acceleration time* of station 1 inverter to 3.0s.

- Acceleration time writing code number: H87 (hexadecimal)
- Acceleration time set data: K30 (decimal)

For the parameter code numbers, refer to *the inverter manual*.

The reply code at the time of instruction code execution is set to D2. (RWr10: *Refer to page 55*)

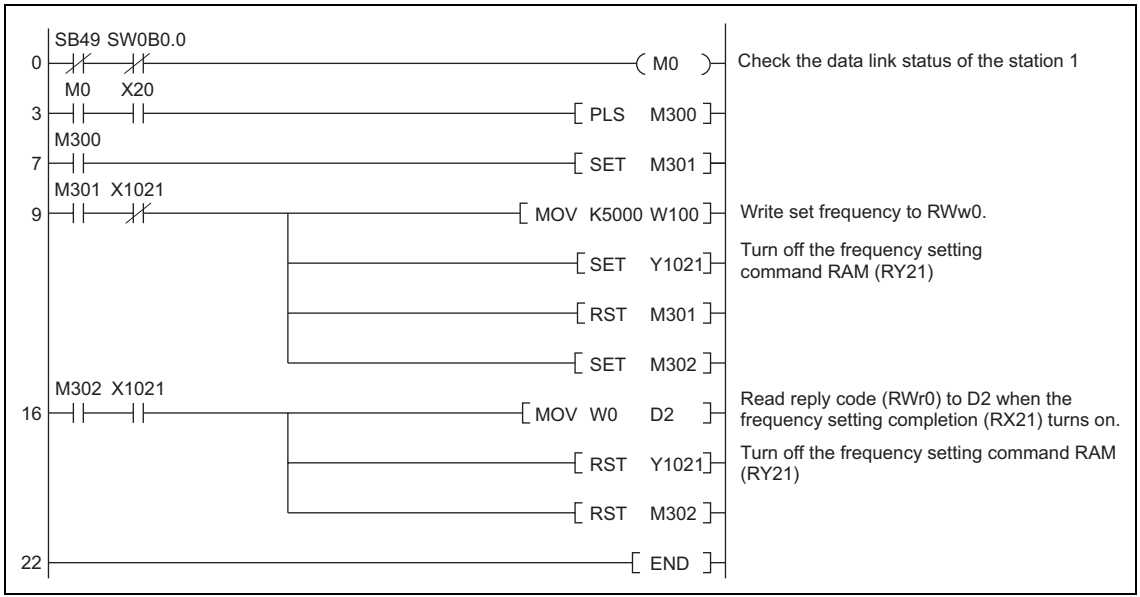


REMARKS

- For parameters having numbers 100 and later, change their link parameter extended settings (set them to other than H0000). Refer to the parameter list of *the inverter manual* for settings.
- For other functions, refer to the instruction codes *(page 57)*.

8.7 Programming example for setting the running frequency

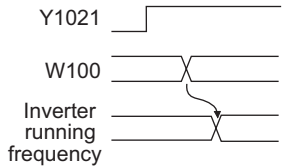
1) The following program example changes the running frequency of station 1 inverter to 50.00Hz
Set frequency: K5000 decimal
The reply code at the time of instruction code execution is set to D2. (RWr0: *Refer to page 54*)



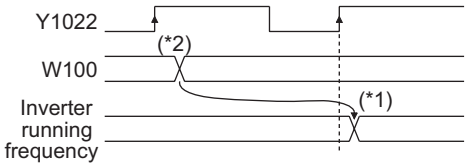
2) To continuously change the running frequency from the programmable controller
After the frequency setting complete (for example, X1021) turns ON, check that the reply code from the intelligent register is H0000, then change the setting data (for example, W100) continuously.

3) Program example for writing data to EEPROM
Modify the following commands of the programming example on *page 76*.
Frequency setting command Y1021 → Y1022
Frequency setting completion X1021 → X1022

<Timing chart when writing to RAM>



<Timing chart when writing to EEPROM>



Reflect to the inverter when Y1022 turns on

*1 For EEPROM, write is made only once when Y1022 is switched on.
*2 If the set data is changed with Y1022 on, it is not reflected on the inverter.

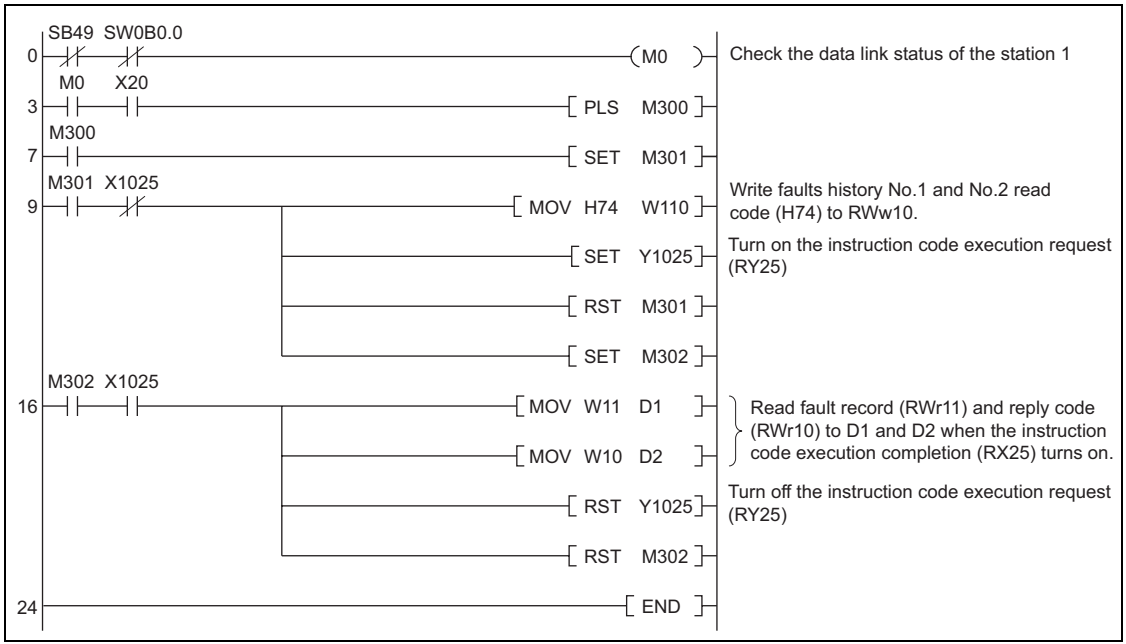
8.8 Programming example for fault record reading

The following program reads fault records of station 1 inverter to D1.

· Faults history No. 1, No. 2 reading code number: H74 (hexadecimal)

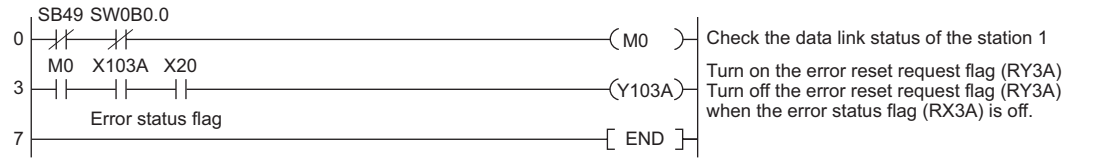
For the error code numbers, refer to *page 61*.

The reply code at the time of instruction code execution is set to D2. (RWr10: *Refer to page 55*)



8.9 Programming example for resetting the inverter at inverter error

The following is a program example for resetting station 1 inverter at inverter error.



REMARKS

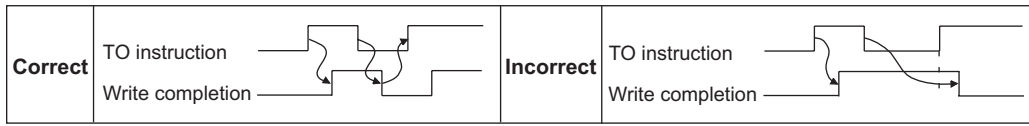
- The above inverter reset using RY3A may be made only when an inverter error occurs.
  While *Pr. 349 Communication reset selection* = "0", inverter reset can be made in any operation mode.
- When using the instruction code execution request (RY25) with the instruction code (HFD) and data (H9696) to reset the inverter, set a value other than "0" in *Pr. 340 Communication startup mode selection* or change the operation mode to the network operation mode. (For the program example, *refer to page 71*)
- Refer to *page 31* for operation conditions of inverter reset.

8.10 Instructions

(1) Programming instructions

1) Since the buffer memory data of the master station is kept transferred (refreshed) to/from the inverters, the TO instruction need not be executed every scan in response to data write or read requests.
The execution of the TO instruction every scan does not pose any problem.

2) If the FROM/TO instruction is executed frequently, data may not be written reliably.
When transferring data between the inverter and sequence program via the buffer memory, perform the handshake to confirm that data has been written without error.



(2) Operating and handling instructions

1) Command only from the programmable controller can be accepted during CC-Link IE Field Network communication.
The run command from external and parameter unit is ignored.

2) If different inverters have the same station number, the communication cannot be performed properly.

3) The inverter trips and displays "E.OP3" if data communication stops for more than the time set in *Pr. 500 Communication error execution waiting time* due to a programmable controller fault, an open Ethernet cable etc. during CC-Link IE Field Network communication.

4) If the programmable controller (master station) is reset during CC-Link IE Field Network communication or if the programmable controller is powered off, data communication stops and the inverter trips and displays "E.OP3".
   To reset the programmable controller (master station), switch the operation mode to the External operation once, then reset the programmable controller.
5) When *Pr. 340* = "0 (initial value)", any inverter whose main power is restored is reset to return to the External operation mode. To resume the Network operation, therefore, set the operation mode to the Network operation using the programmable controller program.
   Set a value other than "0" in *Pr. 340* to start in the Network operation mode after inverter reset.

(3) Troubleshooting

1)Operation mode does not switch to the Network operation mode

- Check that the option unit (FR-A7NCE) and Ethernet cables are fitted properly. (Check for contact fault, break in the cable, etc.)
- Check if *Pr.434 Network number (CC-Link IE)* and *Pr.435 Station number (CC-Link IE)* are correctly set. (Check that their settings match with the program, that the network number is set within the range, that no overlapping stations exist, and that the station number is set within the range.)
- Check that the inverter is in the External operation mode.
- Check that the operation mode switching program is running.
- Check that the operation mode switching program has been written correctly.

2)Inverter does not start in the Network operation mode

- Check that the inverter starting program has been written correctly.
- Check that the inverter starting program is running.
- Check that *Pr.338 Communication operation command source* is not set to external.

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Jul. 2011	IB(NA)-0600453ENG-A	First edition

INVERTER

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IB(NA)-0600453ENG-A(1107) MEE Printed in Japan Specifications subject to change without notice.